THE

JOURNAL OF GAS LIGHTING.

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVI. No. 382—19th YEAR.] LONDON, JUNE 11, 1867. [Subscription per Ann. { 15s. in Advance / 18s. Credit.] TREBLE No. 1s. 4d. Unstamped.

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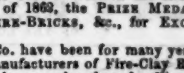
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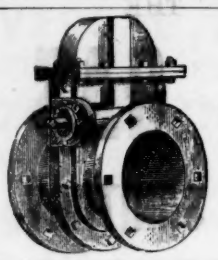

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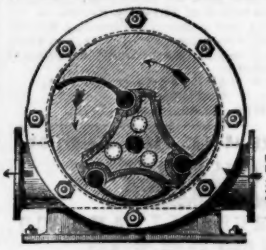

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☞ *See "Practical Mechanic's Journal," Dec.* 1, 1865; *also, p.* 711 "JOURNAL OF GAS LIGHTING," *Sept.* 18, 1866.

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It is worthy of remark, that the only two other Firms who receive Awards *both manufacture imitations of Thomas Glover's* Patent Dry Gas-Meter, and the reason given for these Awards is "*construction* and sound workmanship." Thomas Glover, therefore, claims that the *construction* of his Meter has obtained *three Awards from the Jury of the International Exhibition of* 1862; at the same time, *contrasting* the Award granted for his Meter by the words, "*For excellence of manufacture, as regards Dry-Meters.*"

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NOTICES.

The subscription is 15*s.* per annum, if paid in advance during the month of January, or 18*s.* credit, in two sums of 9*s.* each, in July and January of each year. Post-Office orders must be made payable at the Charing Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, June 25, and the subsequent numbers on each successive alternate Tuesday.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 11, 1867.

Notes upon Passing Events.

The report of the Royal Commission on railways is the result of the deliberations of men so eminent, so experienced, and so able, that it cannot be dismissed in a few newspaper paragraphs or glowing articles in praise of the system particularly favoured by any writer. It has been pronounced a very tame and common-place production; but such is English life—the liberty to which we are so accustomed, that we scarcely value it. The peace and security which we enjoy are so much matters of course, that to the common world the result of centuries of civil and religious life seems tame and common-place. We will first notice the few suggestions in the way of change which the commissioners make. They recommend that Parliament should cease to interfere with the financial arrangements of the companies, because "this detailed interference "with the capital of companies does not appear to have "secured to Parliament any practical control over the finances "of railway companies in cases where they have not been able "to keep within the limits originally assigned by Parliament; "nor to have protected the public from any abuses which "might have crept in if the public had been left under the "operation of the Joint-Stock Companies Act." Now that Parliament has adopted the policy of placing lawful enterprise, conducted by joint-stock capital, within reach of all associations of persons more than six in number, and has conferred upon them the privilege of limited liability, it would appear to be a more judicious course that Parliament should relieve itself from all interference with the incorporation and financial affairs of railway companies, leaving such matters to be dealt with under the Joint-Stock Companies Act, "*and should limit its "own action to regulating the construction of the line, and the "relations between the public and the joint-stock companies so "incorporated.*" If this recommendation were adopted, Parliament would be saved a vast amount of useless labour, and the public would simply look to the documents filed in Serjeants Inn to learn the amount of capital raised or to be raised by shares or debentures. The mere enaction that no debentures not registered should have any effect would throw a flood of light and confidence on railway finance. The commissioners suggest an amendment of the Joint-Stock Companies Act in the direction to which we have pointed. The next suggestion is "that the Companies Clauses Consolidation Act should, "as respects the audit of accounts and the power of the share-"holders to inspect them, be assimilated to the provisions of "the Joint-Stock Companies Act." This points to the publication of accounts which persons of ordinary abilities can understand. Of late years the art of account keeping has been turned chiefly to the ends of mystification. A first-rate accountant can make any figure statement plain if he pleases; but he seldom does please, and so it requires another to make out the tables of "the great mystery man." The third suggestion is "that railway companies should be compelled to "keep at the office of the Registrar of Joint-Stock Companies "a complete collection of all Acts in force applicable to their "undertakings." Thus the commissioners recommend that the attempted reform of railway legislation should be confined to giving the utmost certainty and publicity to their undertakings, and that the service of the public should be left to self-interest and private enterprise.

The following are the recommendations for increasing the facilities of railway travelling:—That railways should be compelled to exhibit at every station a true list of the whole of the fares and rates charged from that station, and to give full information as to special contracts, rebates, drawbacks, and other deductions; that companies should be compelled to publish accurate lists of the distances between the stations on their lines; that companies should be bound, under penalties, to give at least a week's notice of any alterations of time of their regular passenger trains. The one interference that, with the management of traffic, the commissioners suggest is, "that railway companies should be required to afford "greater facilities for carrying the ordinary third-class traffic, "by running at least two trains, with third-class carriages "attached, each way daily, and that, in such mixed trains, "whenever return tickets are issued for second-class passen-"gers, they should in like manner be issued for third-class "passengers." Also, "that workmen's trains should be run "in and out of every great town." We should go further and adopt the recommendation of a French commission, and lay down a rule "that every passenger (in trains going a "day's journey) should be able to sit comfortably, and have "his back to his seat, against which he could lean his head to "sleep; that in summer passengers should be adequately pro-"tected against the rays of the sun; and that in winter some "cheap system of warming should be adopted, if possible." These claims are reasonable, because the railway system has driven all those cheap conveyances off the road by which the labouring migratory poor got lifts along the road, and thus, partly riding and partly walking, and sometimes working at between farms or towns, made their means, however small, carry them long distances. Third-class trains travelling any distance should be provided with water-closets, or perhaps, better still, earth-closets for the use of women with children. The want of such conveniences leads to much suffering and disgusting indecency.

With respect to the Post-Office, the foundation of the principal grievances of the brothers Rowland and Frederic Hill, it is sensibly suggested that a tariff might be fixed by a general Act, and that in cases where the Postmaster-General requires special services, the question of remuneration might be settled by arbitration. With respect to the *conveyance of parcels*, a branch of traffic which gives rise to much and just

complaint against railway companies, it is remarked "that "railway companies are not bound to carry parcels, nor is "there any tariff for parcels, fixing the charges for collection "and delivery, in Acts of Parliament. The public is, there- "fore, at their mercy." The commissioners "consider that a "separate tariff should be laid down and published to govern "the conveyance, as distinguished from the collection and "delivery of parcels, so as to enable the rates of charges to "be kept down by the free action of individuals acting as "carriers by railway." They also "consider that the time has "arrived when railway companies should combine to devise some "rapid and efficient system for the delivery of parcels." "The "employment of a uniform system of adhesive labels for parcels, "somewhat similar to that now in use on some of the northern "lines for the conveyance of newspapers, is one of the most "obvious methods for facilitating payment and accounting." And they add, "On companies effecting such an arrangement, "we recommend that a general Act should be passed, limiting "their liability for each parcel to a certain amount, unless a "greater value be declared and paid for, at a settled scale, at "the time of transmission." Those who remember the fierce battles fought on the gauge question, and the wonderful pertinacity and dexterity with which the engineer and secretary of the Great Western earned leave to ruin the shareholders, will read with interest the following concluding recommendation, in the 6th section of the commissioners report:—"We are of opinion that the continued existence of "the double gauge is a national evil. We think it worthy of "consideration whether it may not be desirable to require the "broad gauge to be put an end to, and, as the evil has arisen "to some extent from the proceedings of Parliament, whether a "loan of public money should not be granted for that purpose." And the commissioners go on to observe, for the benefit of the followers of the Chadwickian school, "The injury that may "result from a Government laying down a dogmatic rule for "regulating railway enterprise is forcibly illustrated by the fact "that, while two gauges were encouraged in England, a third, "agreeing with neither, was made compulsory in Ireland." By this arrangement the railways of Ireland have been deprived of all the advantages they might have derived from the use of engines and rolling stock from English lines. The cost of the Irish railways has, by this enlarged gauge, been rendered compulsorily more expensive than of important English lines, although the traffic must be much less.

The report contains incidentally a comparison of the condition of the railway systems on the Continent and in the United Kingdom. They first notice that unrestricted competition and private enterprise have bestowed on this country an amount of travelling and conveying accommodation that no other country possesses. "The policy of the French Govern- "ment has materially protected the companies; it has not "allowed more railways to be made than it considered would "adequately accommodate each." Shareholders flourished, while merchants and manufacturers pined and travellers were cramped and delayed. Thus, in France, there is only one lineal mile of railway open to every 26 square miles of country, whilst in England there is one to every six square miles. The result is that every passenger and goods train in France is fuller than in England, and also that those who desire to travel or send goods must, on an average, pay a heavy rate for road carriage besides the railway fare. Whereas, in England, a very limited amount of road carriage will bring passengers or goods on the railways except in very mountainous and unproductive districts. As respects passenger fares, in many continental states the first and second class particularly are lower than in this country. But there are several circumstances to be taken into consideration before giving too much weigh to this consideration. With us return tickets are issued almost invariably, even on suburban lines, at a reduction of 25 per cent. In France and Belgium return tickets are rarely and exceptionally issued. Excursions trains are more frequent in this country, and start so regularly at certain seasons, that persons of limited means make their calculations accordingly. In many instances the fares, by excursion trains, do not average a farthing a mile. The greater frequency and pace of the trains must be taken into account where time is money. The nominal allowance of luggage is much more liberal here than on the Continent. Charging for luggage is quite the exception, the allowance being double that of France. In Belgium all luggage is paid for. The process of weighing in England is simple, quick, and informal; on the Continent it is often offensively formal, always slow. As a rule, in England railway officials are the servants of the traveller; on the Continent they are very often his insolent masters. In the carriage of all merchandise the superiority of the English system is very decided. The rates for the great bulk of merchandise are much lower than on French lines, and the station accommodation much more complete. But expedition is a great point in the carrier business, and there is no comparison between English and foreign lines on this point. There are no laws for the delivery of goods. The companies are bound to deliver goods without unreasonable delay, and losses by delay are promptly recovered by actions in the county or other courts. Goods are usually delivered the day following that on which they are despatched. In France, the company is allowed three days, and extra time for distances above 100 miles. In comparison of rates, it must also be remembered that our companies frequently and generally work under the maximum, and are open to a bargain. Foreign railways are not allowed any discretion in their charges. Indeed, a French commission in 1863 reported elaborately in favour of the English railway goods system, and especially the rapid delivery and the power of making special bargains with customers.

The commissioners investigated the cost of working railways, and had the advantage of the evidence of such men as Sir Daniel Gooch. Their report is a complete answer to those extravagant theorists like Mr. Galt, who base their calculations of profit on lines leased from Government or worked by Government on impossible economies in management. The commissioners give the comparative expenses, under the following heads, in 1842 and 1865:—"Maintenance of way," "Locomotive charges," "Repairs of carriages," "Traffic "charges," "Rates and taxes," "Government duty," "Compensations," "Legal expenses," and the difference between the two periods is insignificant. Maintenance of way is about 1 per cent. more, locomotive charges 3 less, repairs of carriages and traffic charges about 5 more. They observe the mere locomotive and traffic charges amount, at the present time, to 64·95 per cent. of the whole, and the maintenance of way to 18·31 per cent. additional, making a total of 83·26 per cent., and these heads of expenditure must always form the main item of charge under any system of working. The fallacious way in which statistics may be used by cooks of the Edwin Chadwick school may be illustrated from the comparative expenses of maintenance of way on the Fleetwood and Preston Railway, where they cost under £60 a mile, and on the London and Blackwall Railway, where they amount to nearly £1000 a mile; but then, in the latter case, the receipts amount to £21,000 a mile, and in the former to about £870 a mile. But in, say, a Society of Arts discussion, an ignorant and sanguine, or a vehement and unscrupulous orator might be found quoting the cheap maintenance of some foreign line with no traffic against one of our lines where passengers and goods trains thunder along without ceasing day and night. The cost of maintenance of way follows the amount of traffic. The cost of working a train on the Great Northern of France is about 3d. a mile less than on the South-Eastern, and a penny more than on our English Great Northern.

There is certainly one mode of economizing the working of railways, that is, by diminishing the number of passenger trains and the number of carriages, and consequently compelling passengers to change at frequent junctions, so as to avoid half-empty through carriages. In the same way with goods, if the companies took as long a time on the road as in France and Germany they could fill their trucks more full. But although a philosophical despot may dream of such regulations, we know that in this country, where we are ruled much more by public opinion as expressed in newspapers than by Acts of Parliament, any such arrangements for the benefit of shareholders in a railway monopoly would be impossible, they would not stand a month. Who that has travelled from Ostend to Harburg does not remember the halts and descents in the middle of the night, every man and woman carrying his or her own baggage, without the slightest assistance, for love or money, from the few porters, who turn you out like sheep out of a truck. Mr. Stewart, late secretary of the London and North-Western Railway Company, stated before the commission that whilst 4482 passengers were booked on one day from Euston Square, the trains to accommodate them contained 13,512 seats, the large excess arising from the desire to send through carriages to so many branch lines.

In 15 up trains, to accommodate 179 persons, carriages containing 1274 seats were put on. Mr. Stewart also stated that the average weight of goods put upon a truck capable of containing 5 tons does not exceed 1¾ ton. With this, and a mass of other thoroughly reliable evidence of the same character before them, it was not extraordinary that the commissioners came to the conclusion that the only way in which an increased receipt in proportion to the cost of running the trains can be anticipated, is in carrying carriages full of passengers and trucks full of goods. "*But this means that the passenger trains "would be less frequent and more crowded, that passengers to "branch lines would have to change carriages more frequently, "and that goods would have to be detained until full truck loads "were made up, which would result in a slower delivery of goods.*" We do not think the British public would consider such a change railway reform.

The commissioners, in the first part of their report, in considering the schemes for the purchase of railways by the Government, and the leasing of them to private companies, dismiss the notion that the Government could make a profit out of the purchase of the railways, because the Government could not borrow the large sum required without depressing the value of public securities, and would therefore be compelled to exchange the income of railways for an equivalent in Consols. As to the economy in working to be obtained by lessees, that theoretical profit has been in a great degree disposed of by our previous quotations. The commissioners do not believe in the possibility of such a reduction of the working expenses, or such an increase of the work out of the same plant, as would enable an appreciable reduction of fares; on the contrary, they anticipate an increase rather than a decrease in the great heads of expenditure. They observe—and these words may fitly conclude our notice of this authoritative answer to volumes of ignorant assertions by Mr. Chadwick and his school—that "whatever may have been the contradictions "of the course of (British) legislation which has thus been "pursued, it cannot be doubted that it has led to a very rapid "development of the railway system, and, consequently, of "the national resources—probably far more rapid than could "have taken place under any other conditions—and has in-"duced improvements in the construction and working of the "railways which, without the spirit of emulation engendered "by it, must have taken years to attain. Thus, while in "France there is less than 1½ mile of railways, in England "and Scotland there are 2½ miles of railway to each five thou-"sand inhabitants. Under these conditions, the railway enter-"prise of the country, at the end of 1865, had raised shares "and loans to the extent of nearly five hundred millions, and "opened over thirteen thousand miles of railway. These had "carried during the year (exclusive of 97,000 season ticket-"holders) 252 millions of passengers, for the conveyance of "whom over sixteen millions had been received, and, during "the same year, nearly twenty millions for the conveyance of "live stock, minerals, and merchandise, the profit on the "working being about 4·1 per cent."

THE INSTITUTION OF CIVIL ENGINEERS AND MR. SCOTT RUSSELL.

As our readers may possibly consider that our last article on this subject implied a promise that we would review the sequel of the book which the Institution of Civil Engineers has decided on disseminating, not only from "India to the "pole," but throughout the extent of that empire on which we are told "the sun never sets," we shall endeavour to satisfy their yearnings.

As foul air within *closed* doors produces physical nausea and headache, so its moral parallel superinduces *ennui* and mental disgust; and such we confess to be our feelings after the perusal of a series of documents which, while they reflect little credit on any one concerned, are without question damnatory, at least of the discretion and appreciation of justice of the majority of those whose sayings and doings they recount. Letter No. 1, Appendix A, is as follows:—

24, *Great George Street, Westminster, May* 12, 1866.

Dear Sir William,—Will you oblige us by a copy of the statement regarding your late transactions with Mr. Scott Russell?

Our object is, in case we are so advised, to bring it under the notice of the council of the Institution of Civil Engineers.—Yours faithfully,

Sir William Armstrong, Kt. (Signed) G. P. Bidder. J. Hawkshaw.

This letter is the first in the correspondence that, at page 1, is "stated to have been forwarded by Messrs. Bidder and "Hawkshaw to every member of the council, to facilitate the "investigation delegated to the members of council by the "resolution of the general meeting of December 18, 1866." "Our object is, in case we are so advised," sounds very business-like, even lawyer-like, yet the gentlemen whose signatures appear above nowhere tell us on whose "advice" they proceeded two days after to address to Mr. Russell the following letter:—

24, *Great George Street, Westminster, May* 14, 1866.

Dear Sir,—Herewith we enclose to you copy of a statement made by Sir William Armstrong, and of his accompanying note.

Apart from our connexion with the Institution of Civil Engineers as past presidents, and of which you are a vice-president, we should not concern ourselves in any way in this affair, but under the circumstances we deem it our duty to forward to you the enclosed statement, as it appears to us to require your consideration.—We are, &c.,

John Scott Russell, Esq. (Signed) G. P. Bidder. John Hawkshaw.

Strict accuracy would in this letter, in the place of the words, "a statement made by Sir William Armstrong," have substituted (see letter No. 1) "the statement elicited by us "from Sir William Armstrong." We should have thought that "past presidents," dwelling serenely in a kind of mortal heaven, ought to be above the petty squabbles and sublunary jealousies that actuate ordinary *civil* engineers—that men advanced to their position, far from being the first to drag the Institution they have left below them into an illegal, disgraceful, and humiliating position, would have been, on the contrary, those to whom that Institution might look up for counsel and guidance in cases of difficulty—that they were the men who ought to stand, as it were, in the position of arbitrators, to mete out "justice and "judgment" to their contending or erring brethren of inferior degree. But these ill-advised "past presidents" deemed it to be their "duty to forward to you the enclosed statement, as it "appears *to us* to require your consideration." "*L'Etat c'est "moi*" was the dictum of Louis XIV. The Institution of Civil Engineers—"that's us" (in Devonshire dialect), is the exclamation of these gentlemen.

Letters No. 6 and 7, interchanged between Mr. Russell and Mr. Bidder, relate chiefly to an assertion and denial of words alleged to have been spoken. Each of our readers must for himself judge of the relative amount of credence to be assigned to the parties.

Letter No. 8, marked "private," is as follows:—

Newcastle-upon-Tyne, May 25, 1866.

My dear Sir,—I have received your note of yesterday's date, accompanied by Mr. Scott Russell's letter to Mr. Bidder of the 17th inst., and of Mr. Bidder's reply.

Mr. Russell's letter contains no denial of the only important fact of the case—viz., his having received and wrongfully retained the large sum of money referred to in my statement.

If further evidence be required on my part, I shall be ready to produce the correspondence that has passed on the subject, and which exhibits all the circumstances of the transaction.—Yours faithfully,

C. Manby, Esq. (Signed) W. G. Armstrong.

This letter contains a charge which (to borrow a phrase from a burlesque of Parliament) may be called the "gravamen" of the business; but as the "gravamen" does not here turn up for the first time, the letter itself might have passed unchallenged, were it not that it was written in reply to one from Mr. Charles Manby, who here (acting apparently as Mr. Bidder's private secretary) for the first and last time appears upon *this stage*. On this day, May 25, 1866, we catch a momentary glimpse of *his* head above water, and then, to use an expression of Carlyle's, "he dived below sound-"ings." All naturalists, as well as the author of "The "History of a Clay Farm," know that "Talpa" works most efficiently where his presence is unsuspected and unseen. The note referred to of "yesterday's date" does not appear in the appendix. We feel sure all our readers will regret that Sir William Armstrong's reply is given without the letter of Mr. C. Manby that elicited it, and will lament with us that the note of so able a manager has been (doubtless through inadventure) withheld, thus, unfortunately, rendering the "corre-"spondence" *incomplete*.

Appendix C contains an array of letters, legal and otherwise (we do not mean illegal), together with a mass of invoices of a nature to remind us—

> Of sallies and retires; of trenches, tents,
> Of palisadoes, frontiers, parapets;
> Of basilisks, of cannon, culverin;
> Of prisoners' ransom, and of soldiers slain;
> And all the currents of a heady fight.

We shall now make some brief comments on the oral evidence (Appendices E to K) given before the "Star Chamber in Great "George Street," which, although it contrived to keep its doors so effectually closed during its sittings as to exclude any ray of external light, yet succeeded in caging only two or three of its itinerant *judges* to attend the case throughout.

The evidence of Sir William Armstrong is, as might be expected, that of a sore and angry man; his replies occasionally assume the appearance rather of the "dicta" of a judge than the responses of a witness. Having been formerly a "member "of council," he could not easily divest himself of the feeling that he was as competent to handle the rules of evidence as either the "presiding judge" or any of his *puisne* brethren, although over one of these, at least, he certainly failed to establish superiority.

The evidence of Captain Noble is manly and straightforward. His replies betray occasional forgetfulness that he attended the council as a witness and not a judge; but that a man "of like "passions with other men," suffering under the sense of pecuniary loss, should err to this extent is but a venial sin: our only surprise is that the "presiding *judge*" did not inform him that the court alone had the right to express an opinion or decide on the *relevancy* of questions.

One reply of Captain Noble's, at page 203 (and the sentiment it contains not there for the first time expressed), affords us unmixed satisfaction—viz., "I cannot consent to put myself "in the place of an accuser." Although smarting under pecuniary loss and a sense of wrong inflicted, this "officer and "gentleman" could not sever himself from his antecedents; he left the sacred "duty" of "accuser" to one less squeamish.

The tone of several of the judges is opposed to the defendant, still the weight of evidence is that Mr. Russell was a "principal" and not an "agent." One point of importance that is clear and that ought to be steadily kept in view is, that not being "up to time" in delivery was the first breach of a very loose and indefinite contract.

This portion of the book, which reads like the account of a brawl, proves that Mr. Russell has not had—from the constitution of the tribunal could not have had—a fair trial. The book itself is a double-edged sword—it inflicts a wound on Mr. Russell, but it has cleft the council of "the Institution of "Civil Engineers" in twain. One portion of it retains sensation and vitality, the mass is a "*caput mortuum*." The gentlemen composing it are the judges of the best way to burnish their own *honour*. The connexion of some with it is, we perceive, styled "honorary." Cynical persons ask if the addition of a monosyllabic prefix might not better describe the recent position. The public believes that some leading engineers have accumulated ample wealth much in the way in which "Balaam the son of Beor" was willing to earn it—that, given "the seven bulls and seven rams" in the shape of a fee offered at the shrine of their "experience," they are ready "to bless or to curse" from any "Pisgah" on which their employers may choose to place them; and that, in proportion to these questionable wages, they assume airs of insolent superiority over their less wealthy brethren, the working bees of the profession.

> Oh! wad some power the giftie gie us,
> To see oursel' as others see us,
> It wad frae monie a blunder free us,
> And foolish notion.

When the Civil Engineers succeed in establishing that great building, the very thoughts of which last year almost acted upon them like an explosive mixture, they will perhaps, like another great profession located near Temple Bar, complete their arrangements by the erection of a "Basilica," or oratory, in which to offer up their "orisons." The men to whose "æsthetic feelings" London owes so much of its disfigurement will naturally bestow much pains on internal decoration; and we would suggest that on their "reredos" the "Decalogue" as a whole be omitted, retaining only (in parliamentary language) some of the *clauses*, and adding to the eighth the words, "and be caught out." "Dwellers in glass houses "ought to be careful how they throw stones." Is Mr. Russell to be the "protomartyr" to the outraged purity of some engineers of *unquestionable reputation?*

> Hypocrisy, in mercy spare it—
> That holy robe, oh, dinna tear it!

Circular to Gas Companies.

The select committee of the House of Commons on the Metropolis Gas Bill have not yet concluded their labours. The case for the Metropolitan Board of Works and the Corporation of London, who are practically the promoters of the Bill, was closed on the 28th ult., and on the same day witnesses were called on behalf of the gas companies, without any previous statement of their case by counsel. The examination of witnesses was continued for five other days, and on the 6th inst. the committee adjourned for the Whitsuntide holidays until Monday next. We regret that the limited space at our disposal compels us to break off our report of the proceedings of the committee at the conclusion of the case for the petitioning promoters, who had proposed to fill up the blanks in the Bill provisionally with the figures 3s. 6d. per 1000 feet for the price of the gas, and 18 candles for its illuminating power. The principal witnesses produced in support of the Bill, in addition to those noticed in our last, were Mr. Heron, the town-clerk of Manchester, and Mr. Cleminshaw, the former manager of the gas-works in that city, it being a great object with the promoters to show that gas may be supplied in London of the same quality and price as in that exceptionally highly favoured town. The peculiar circumstances which have placed Manchester in its present enviable position with regard to the supply of gas it is unnecessary now to repeat, but in the evidence given by those witnesses it was attempted to be shown that in the production of gas London is nearly as well situated as that city. Mr. Heron stated that since 1844 upwards of £700,000 have been expended in town improvements out of gas profits, that the illuminating power of the gas during the last year was upwards of 21 candles, and that it was very free from impurity. The price was 3s. 2d. per 1000 feet within the city and 3s. 8d. beyond; that the profit for the year amounted to £52,553, of which £20,000 was paid over to the Corporation; and that the proportion of ordinary coal to cannel used in the manufacture of gas was 33 per cent.; the cost of cannel being 15s. per ton, and of the coal 10s., making an average price of 13s. 4d. per ton. In his cross-examination, however, he admitted that the price of cannel had risen, and that it is now 17s. per ton. The principle on which the Manchester Corporation regulate the price of gas Mr. Heron stated to be, that they fix the rate of profit at the maximum standard allowed by Parliament to be divided by any gas company—viz., 10 per cent.—4 per cent. of which is set aside to pay interest on borrowed money, and 6 per cent. is appropriated by the Corporation for improvements. If the profit exceed 10 per cent., then the price of gas is reduced, the capital on which the 10 per cent. is calculated being about £600,000. Mr. Heron also stated that the gas-works were not rated until about two years ago. Mr. Cleminshaw boldly stated, at the commencement of his examination, that gas of 18-candle illuminating power should, under proper arrangements, be supplied in London for 3s. 6d. per 1000 feet, and leave the companies a dividend of 10 per cent. on their present capitals. On comparing the cost of the production of gas in Manchester and London, he stated that the real cause of the high price of gas in London is the very large leakage in the mains and the cost of keeping those mains in repair, and that there is no reason why the cost for wages, purification, wear and tear, and leakage should not be the same in London as in Manchester; and that if those corrections were made 12-candle gas might be supplied in London at 3s. per 1000 feet. Mr. Cleminshaw disputed the correctness of the estimate of the engineers of the metropolitan gas companies as to the cost of the manufacture of 18-candle gas, and asserted that it was wrong in regard to the cost of fuel for carbonization, in the quantity of cannel said to be required to produce 18-candle gas, and as to the price of cannel and coke. He estimated that Newcastle coal and Wigan cannel used in equal proportions should produce 19½-candle gas, for, with a mixture of 19½ per cent. of common coal with Wigan cannel, he had produced 23-candle gas. He said that the illuminating power of the Manchester gas is from 22 to 23 candles. Mr. Cleminshaw, in his cross-examination, admitted that the statements of the engineers as to the cost of production of 12-candle gas were fair and reasonable, and that his estimate respecting 18-candle gas was founded on the accounts of the London companies for 1864, and not on the experience of 1866, on which the estimate of the engineers was based. In the course of the examination of this witness an attempt was made by the opponents of the Bill to obtain from him an

acknowledgment of the fact that the supply of cannel coal is very limited, and that by its increased consumption there would necessarily be an increase of price, but the chairman stopped the inquiry into the probable exhaustion of cannel and as to its price in future. The high illuminating power of 22 or 23 candles assigned by Mr. Cleminshaw to the gas produced from the stated mixture of common coal with cannel, and of 21·6 candles, as stated by Mr. Heron, created a suspicion that there must have been some error in the photometrical observations, and Dr. Odling and two other gentlemen were commissioned by the opponents of the Bill to test the gas. Their experiments extended over two days, and it appeared from their report, which was subsequently given in evidence, that the minimum was 16·69 candles, the maximum 19·71, and the mean of twelve experiments 18·38 candles; a result which might reasonably be expected from such a mixture of coal and cannel. It is a remarkable fact that in the annual accounts of the Manchester Gas Committee no mention is made of common coal, the word "cannel" alone being used to designate the material from which the gas was manufactured. The other witnesses called to support the Bill were Mr. Romans, Mr. Clift, Mr. Beal, and Mr. Bell. Mr. Romans, as agent for the sale of the Lothian cannel, merely stated that there is no scarcity, nor fear of scarcity, of Scotch cannel, and that its illuminating power, with a production of 12,500 feet of gas per ton, is equal to 33·8 candles. Mr. Clift repeated the evidence he gave last year on the London Corporation Gas Bill, and asserted that a mixture of three-tenths of good Scotch cannel with seven-tenths of Newcastle coal would produce 18-candle gas, which might be supplied at the rate of 3s. per 1000 feet, with a profit of 6 per cent. In his cross-examination it came out that he is proprietor of the gas-works at Redditch, where 5s. per 1000 feet is charged for 13-candle gas. As a gas engineer, he positively contradicted the estimate of Dr. Frankland, that it is possible to produce 10,000 cubic feet of 15-candle gas from one ton of Newcastle coal. Mr. Beal, who made himself conspicuous in 1860 as a supporter of the Metropolis Gas Act, appeared before the committee as the representative of the delegates from nineteen metropolitan parishes. He stated his belief that the gas companies had endeavoured honestly to carry out the provisions of that Act, but that the vestries had altogether failed to carry out any one of the duties which the Act imposed upon them, and therefore it was the gas consumers were anxious that the Government should arm some stronger municipal power with the requisite authority to deal with the gas companies, in order to obtain the full advantages which the Act conferred. Mr. Denison, who was counsel for the vestries in 1860, and was in full possession of all that occurred before the committee at that time, cross-examined Mr. Beal with great effect, and obliged him to admit that the Act which it is now alleged was passed entirely to benefit the gas companies, gave substantial advantages to the consumers, and that it was supported by the vestries in the House of Lords, after all the amendments in the committee of the Commons, which are said to have completely altered the character of it, had been made. Mr. Denison also drew from Mr. Beal admissions on various points showing the advantages which the gas consumers had gained by the provisions of the Act. On the following day Mr. Bell, the manager of the Rochdale Gas-Works, which belong to the Corporation, stated that the cost in that town of manufacturing 21-candle gas did not exceed 2s. 8½d. at the consumer's meter, the price of cannel being 15s. 10d. per ton.

The case of the petitioner-promoters of the Bill was closed with the evidence of Mr. Bell; their counsel, Mr. O'Malley, stating that that was all they proposed to offer on the subject of illuminating power and price, and that on the general question they relied on the printed evidence referred to the committee. This rather sudden termination of the case took the opponents of the Bill somewhat by surprise, and called forth some remarks from Mr. Denison on the absence of Dr. Letheby, who had been a principal witness on the London Corporation Bill last session. The first witnesses he called on behalf of the gas companies were Mr. Williamson, a mining engineer, and Mr. M'Kelvey, a coal agent, to prove the advance in the price of cannel and of Boghead, amounting in the case of Lesmahago cannel, to 7s. 6d. per ton, and in Boghead from 35s. to 50s. per ton, exclusive of carriage. Mr. Paddon, the engineer of the Brighton and Hove Gas Company, was next examined, to prove that the reduction of the price of gas in that town to 3s. 6d. per 1000 feet had had the effect of reducing the dividend earned by the company from 10 per cent. to 3¼. Mr. Alfred Wood, engineer of the Hastings Gas Company, gave similar evidence as to the effect of the reduction of price in that town. He stated that up to April, 1865, the company had charged 5s. per 1000 feet, when it was reduced to 4s., and the effect had been to diminish the dividend from 10 per cent. to 7. He estimated that 20-candle gas could not be made at Hastings for less than 4s. per 1000 feet, and that to ensure a dividend of 10 per cent. the price must be 5s. 6d. per 1000 feet. During the five following days witness after witness was called to support the case of the opponents of the Bill, and to contradict on many important points the evidence given in support of it. The engineers of most of the metropolitan gas companies were examined, including Mr. Innes, of the Phœnix; Mr. F. J. Evans, of the Chartered; Mr. H. Brothers, of the Equitable; Mr. Finlay, of the Surrey Consumers; Mr. T. N. Kirkham, of the Imperial; Mr. Harris, of the Great Central; and Mr. Pritchard, of the Western. They were unanimous in contradicting the statements of Mr. Cleminshaw as to the practicability of producing 22-candle gas from a mixture of one-third of Newcastle coal and two-thirds of Wigan cannel, and defended the estimate that they had made of the cost of the production of 18-candle gas, pointing out some errors into which he had fallen in his calculations. With regard to the reason assigned by Mr. Cleminshaw for the loss by unaccounted-for gas in London, which he attributed to the leakage from useless mains which had been allowed to remain in the ground after the districting arrangements, it was proved that all useless mains had been removed. The engineers were equally unanimous in the opinion that it would be impracticable on a working scale to obtain 10,000 cubic feet per ton of 15-candle gas from Newcastle coal, as had been asserted by Dr. Frankland. Their evidence was supported by Mr. Bush, the accountant of the Chartered Company; by Mr. Harry Chubb, the secretary of the Imperial Company; by Mr. Hersey, the inspector-in-chief of the same company; and by Mr. Barber, the solicitor to the Western Company, who also gave details of the financial positions of their respective companies, showing that the increase in the price of coals and labour, accompanied with a reduction of the charge for gas, had greatly diminished their profits. It was stated that the price of cannel had risen within the last year from 21s. 4d. to 26s. per ton, and that the residual products had not realized so much as formerly, thus contradicting the assertion that the price of coke rises with the price of coal, so as to make the cost of the latter not an important item in the manufacture of gas. Among the witnesses examined from the country was Mr. Henderson, the secretary and manager of the Plymouth Gas Company, which is called, *par excellence*, the cheap company. He stated the circumstances which enabled that company to supply gas at 2s. 9d. per 1000 feet, with a dividend of 10 per cent. He said he did not consider the Plymouth gas quite equal to that of London, that the company purchased their works for less than they cost, and that the money was paid by instalments entirely out of the profits when the charge for gas was much higher. The price of coal was the same as in London, but the cost of labour was about 4d. per 1000 feet in favour of Plymouth. Mr. J. Reed, the engineer of the Edinburgh and Leith Gas Company; and Mr. Bartholomew, the manager of the Glasgow City and Suburban Company, proved the great increase in the cost of cannel coal, which the latter attributed in a great measure to the gas agitation in London. There were several other witnesses ready to be called to prove the increased cost of coal, but the counsel for the Bill admitted that fact, and the chairman refused to enter into the question of the probable exhaustion of the supply, and its effect on the future price of cannel. Dr. Odling, who tested the Manchester gas on the 29th and 30th ult., assisted by Mr. Wood and Mr. Sugg, stated that the result of twelve experiments, consisting of ten observations each, made with Evans's and Letheby's photometers, showed that the mean illuminating power was equal to 18·38 candles, and not to 22 or 23, as stated by Mr. Cleminshaw. Mr. Sugg, in confirming the evidence of Dr. Odling, said that he considered the experiments to have been the best that it is possible to make. This exposure of the actual illuminating power of the much-vaunted Manchester gas will tend to dispel the illusion of the wonderful effects of Corporation gas management.

There was some expectation that the case of the gas companies would have been concluded before the commencement of the Whitsuntide holidays, but the unfortunate severance of interests that has arisen, in consequence of the Western Company having conducted their opposition to the Bill distinctly from the other gas companies, has occasioned delay, and produced a want of unity of action which is apparent in the contradictory nature of some of the evidence adduced. The chairman stated, before the adjournment, that it seemed to be a waste of time to take things in detail which might be put before the committee in a minute in an undisputed form; and Mr. Hope Scott, the counsel for the gas companies, said they would endeavour to do that when the committee reassembled, and get everything material tabulated. The case of the Western Company having been finished, it is expected that the whole of the evidence will be completed in one or two more sittings.

The Cheltenham Improvement Commissioners are still at variance with the gas company of that town respecting the terms for lighting the public lamps, and though the existing contract terminates in July next, the commissioners, at their meeting on Wednesday last, adjourned the final consideration of the subject for a fortnight. We have, on a former occasion, stated the particulars of the dispute, which exhibits a glaring instance of the injustice of the practice of supplying public lamps at a less charge than private consumers. The price of 14-candle gas to small consumers is 4s. per 1000 feet, with a discount of 5 per cent., and the public lamps have been supplied at 3s. 5d. per 1000 feet with a similar discount; but the commissioners insisted on a reduction to 3s., and, having the power to manufacture gas for the supply of the public lamps, they threatened to construct gas-works of their own if their demands were not complied with. The gas inspector—who, from having been a repairer of meters, thought himself qualified to act as gas engineer—furnished the commissioners with an estimate of the cost of the construction of works and of manufacturing gas, the fallacies of which we exposed at the time, and the commissioners thought it prudent to seek for other advice. They applied to Mr. Bower, of St. Neots, who adopted many of the gas inspector's notions, it being his interest, as he fairly stated in his report, that the works should be constructed, but he nevertheless advised the commissioners to make an arrangement with the gas company. The terms he proposed were that the average illuminating power of the gas should be 13½ candles; the price 3s. per 1000 feet, including the use of the lamp-columns and lanterns; that the quantity consumed be estimated by average meter indication; and that the lighting and extinguishing should be undertaken by the commissioners. The gas company, who had conceded the price of 3s. per 1000 feet, applied to Mr. Barlow for his advice. He recommended them not to include the use of the columns and lanterns in that price, as it would be equivalent to a further reduction of about 3½d. per 1000 feet, and to propose that the minimum illuminating power of the gas tested at the works should be 13 candles, or 12 candles tested at the company's office in the heart of the town. He advised them to concede the estimation of the quantity consumed by average meter indication, and also that the lighting and extinguishing should be undertaken by the commissioners, under certain conditions. Mr. Barlow concluded by alluding briefly to the estimate for the erection of gas-works, which he believed to be in several respects fallacious. The gas inspector made a subsequent report to the commissioners, dissenting, in many particulars, from that of Mr. Barlow, whose cursory allusion to his estimates was not very palatable. The question was thus left for further consideration, and the inhabitants of Cheltenham are threatened with having their streets in darkness, owing to the unfair exactions of the Improvement Commissioners.

The rejection by the shareholders of the Malta and Mediterranean Gas Company of the proposal to take up a concession for lighting the town of Bari, in Southern Italy—a place of somewhat unenviable notoriety as the head-quarters of brigandage—will serve as a check on the incautious acceptance of concessions for lighting towns with gas without an independent and impartial inquiry into their value. It was elicited, in the case of Bari, that the engineer of the company was himself the concessionaire; and it was proposed to contract for the erection of the works with a firm recommended by him, on an unchecked estimate of £37,957. Fortunately for the company, several of the shareholders had been bitten by speculations offering similar, if not greater, advantages, and the warnings given by those sufferers may have saved the Malta and Mediterranean Gas Company from following the Continental Gas and Water Company, the Colonial and General Gas Company, and other companies into the winding-up court.

Correspondence.

ILLUMINATING POWER OF VIENNA GAS.

SIR,—I am requested by Professor Redtenbacher to correct an error which was inadvertently made in giving me the illuminating power of the gas supplied to the city of Vienna, as stated in my recent lecture at the Royal Institution. The average illuminating power of the Vienna gas is 12 standard candles for the 5-feet flame, instead of 9, as previously announced.

E. FRANKLAND.

Royal College of Chemistry, June 8, 1867.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1560.—HENRY BERNOULLI BARLOW, of the city of Manchester, patent agent, for "*Improvements in apparatus for coupling pipes.*" A communication. May 27, 1867.

1561.—HERBERT FROST, sen., and HERBERT FROST, jun., both of the city of Manchester, machinists, for "*Improvements in apparatus for measuring fluids, which improvements are also applicable for obtaining motive power and for pumping.*" May 27, 1867.

1578.—HENRY COCKEY and FRANCIS CHRISTOPHER COCKEY, of the firm of Edward Cockey and Sons, of the Iron-Works, Frome, in the co. of Somerset, engineers, for "*Improvements in seal or dip pipes in connexion with gas and other retorts.*"

1628.—ANTON GEORG SCHAEFFER, of Gloucester Street, Newcastle-on-Tyne, for "*Improvements in obtaining increased light in the combustion of illuminating matters.*" June 1, 1867.

1653.—THOMAS HARVEY SAUNDERS, of 27, Coombe Road, Sydenham, in the co. of Kent, for "*A new hygienic oil or gas stove.*" June 5, 1867.

GRANTS OF PROVISIONAL PROTECTION.

1272.—PETER SALMON, of 6, Great Smith Westminster, in the co. of Middlesex, for "*Improvements in the manufacture of gas and in apparatus for holding the same.*" May 2, 1867.

1335.—EUGÈNE BOURDON, of 36, Rue de Malte, Paris, in the empire of France, engineer, for "*Improvements in valves for regulating the flow of liquids, gases, and other elastic fluids.*" May 7, 1867.

1371.—JOHN BOWDEN, of Preston, in the co. of Lancaster, surveyor, for "*An improved 'bib,' 'stop,' or water-closet tap or cock.*" May 9, 1867.

1407.—WILLIAM ROBERT LAKE, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*An improved mode of constructing metal cocks, faucets, and other similar articles.*" A communication. May 11, 1867.

1426.—JOSIAH GEORGE JENNINGS, of Palace Road, Lambeth, in the co. of Surrey, sanitary engineer, for "*Improvements in water-closets and sinks, and in apparatus for supplying water thereto and conducting it therefrom, parts of which apparatus are applicable to other purposes.*" May 14, 1867.

1474.—JAMES THEODORE BLAND and EDWIN JOHN BLAND, of 15, Broadway, London Fields, Hackney, plumbers, and THOMAS BREVETOR, of 9, Ash Grove, Hackney, gentleman, for "*An improved apparatus for more effectually regulating the supply of water or other fluids to cisterns or other receptacles, and for economizing the trouble and expense connected therewith.*" May 18, 1867.

1478.—HECTOR AUGUSTE DUFRENÉ, of 10, Rue de la Fidélité, Paris, in the empire of France, and 4, South Street, Finsbury, London, civil engineer, for "*An apparatus for transferring heat from one current of gas to another.*" A communication. May 18, 1867.

NOTICES TO PROCEED.

230.—FRANÇOIS CONSTANT CAMBRELIN, [of Brussels, in the kingdom of Belgium, engineer, for "*Improvements in lighting railway carriages with gas, and in the apparatus employed therein.*" Jan. 29, 1867.

255.—BRISTOW HUNT, of 1, Serle Street, Lincoln's Inn, in the co. of Middlesex, gentleman, for "*Improvements in gas-regulators.*" A communication. Jan. 30, 1867.

429.—ALFRED VINCENT NEWTON, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*An improved construction of water-meter.*" A communication. Feb. 15, 1867.

485.—WILLIAM WEST, of Tredenham House, St. Blazey, in the co. of Cornwall, civil engineer, and JOHN DARLINGTON, of Moorgate Street Chambers, Moorgate Street, in the City of London, mining engineer, for "*Improvements in apparatus for counterbalancing pump-rods, changing the lines or angles of reciprocatory motions, and transferring power and motion from one point to another.*" Feb. 22, 1867.

998.—JOHN AUGUSTUS BOUCK, of Manchester, in the co. of Lancaster, manufacturing chemist, for "*Improvements in burning petroleum, creosote, gas, tar, and other such fluid bodies capable of being used as fuel.*" April 3, 1867.

1102.—JOHN SHORE, of 19 and 20, Cardigan Street, Birmingham, in the co. of Warwick, brassfounder, for "*Improvements in the construction of valves and valve-cocks.*" April 13, 1867.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1324.—FREDERICK WILLIAM BROCKSIEPER, "*Improvements in means for regulating the flow of gas to burners.*" May 27, 1864.

1339.—JOHN HUGGETT, "*Improvements in steam-engines, applicable also to pumps and gas-exhausters.*" May 30, 1864.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MAY 27.

The CRICKHOWELL GAS AND WATER Bill was brought from the Commons, read a first time, and referred to the Examiners.

The CAMBORNE WATER Bill was returned from the Commons, agreed to, with amendments.

The DEWSBURY, BATLEY, AND HECKMONDWIKE WATER, and the HAMPTON COURT UNITED GAS Bills, were returned from the Commons, with the amendments agreed to.

The PLYMOUTH CORPORATION WATER, &c.; WEYMOUTH CONSUMERS GAS; and the BINGLEY EXTENSION AND IMPROVEMENT Bills, were read a second time, and committed.

TUESDAY, MAY 28.

The MITCHAM AND WIMBLEDON GAS, and the WEST KENT GAS Bills, were returned from the Commons, agreed to, with amendments, which were considered, and agreed to.

The MOLD GAS AND WATER, and the HEYWOOD IMPROVEMENT Bills, were returned from the Commons, with the amendments agreed to.

The STOCKPORT CORPORATION WATER, and the SHEFFIELD WATER (AMENDMENT) Bills, were read a third time, with the amendments, and passed, and sent to the Commons.

The CAMBORNE WATER Bill.—The Commons amendments were considered, and agreed to.

THURSDAY, MAY 31.

The following Bills received the Royal Assent:—

The PAIGNTON WATER; SOUTH SHIELDS GAS; STALYBRIDGE GAS; HARTLEPOOL GAS AND WATER; WOOLTON GAS; MANCHESTER CORPORATION WATER, &c.; AYR WATER; PRESCOT GAS; ETON GAS; WELLS (SOMERSET) GAS; KEIGHLEY WATER, &c.; ABERDEEN POLICE AND WATER; DEWSBURY, BATLEY, AND HECKMONDWIKE WATER; HAMPTON COURT UNITED GAS; SALFORD BOROUGH; HEYWOOD IMPROVEMENT; MOLD GAS AND WATER; MITCHAM AND WIMBLEDON GAS; WEST KENT GAS; and the CAMBORNE WATER Bills.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the CRICKHOWELL GAS AND WATER Bill have been complid with; and the certificates that no further Standing Orders are applicable to the KIRCALDY AND DYSART WATER Bill.

The WIDNES GAS, WATER, AND IMPROVEMENT Bill was brought from the Commons, read a first time, and referred to the Examiners.

The FARNWORTH PARK AND IMPROVEMENT Bill was returned from the Commons, with the amendments agreed to, with an amendment; the said amendment considered, and agreed to.

The ROCHESTER, CHATHAM, AND STROOD GAS, and the CAMBRIDGE GAS Bills, were returned from the Commons, with the amendments agreed to.

The BINGLEY EXTENSION AND IMPROVEMENT Bill was reported, without amendment.

The BIRKENHEAD IMPROVEMENT COMMISSIONERS Bill was read a third time, with the amendments, and passed, and sent to the Commons.

MONDAY, JUNE 3.

The WEYMOUTH CONSUMERS GAS Bill was reported, with amendments.

The SHEFFIELD WATER (NEW WORKS) Bill was read a third time, with the amendments, and passed, and sent to the Commons.

The HUYTON AND ROBY GAS Bill was returned from the Commons agreed to, with amendments; the said amendments considered, and agreed to.

TUESDAY, JUNE 4.

The ENFIELD GAS Bill was reported, with amendments.

The RICHMOND GAS Bill was returned from the Commons, agreed to, with amendments. The said amendments considered, and agreed to.

The SHEFFIELD WATER (AMENDMENT) Bill was returned from the Commons, with the amendments agreed to.

The KIRKCALDY AND DYSART WATER, and the CRICKHOWELL GAS AND WATER Bills, were read a second time, and committed.

The BINGLEY EXTENSION AND IMPROVEMENT Bill was read a third time, and passed.

THURSDAY, JUNE 6.

The WEYMOUTH CONSUMERS GAS Bill was read a third time, with the amendments, and passed, and sent to the Commons.

The EAST LONDON WATER (THAMES SUPPLY), and the EAST LONDON WATER (VARIOUS POWERS) Bills, were brought from the Commons, read a first time, and referred to the Examiners.

The DARTFORD GAS, and the GREAT GRIMSBY GAS Bills, were returned from the Commons, agreed to, with amendments. The said amendments considered, and agreed to.

The BIRKENHEAD IMPROVEMENT COMMISSIONERS Bill was returned from the Commons, with the amendments agreed to.

Petitions were deposited against the WOLVERHAMPTON NEW WATER Bill, from the Local Board for the district of Heath Town, and the Local Board for the district of Wednesfield.

FRIDAY, JUNE 7.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the WIDNES GAS, WATER, AND IMPROVEMENT Bill have been complied with.

The SHEFFIELD WATER (NEW WORKS) Bill was returned from the Commons, with the amendments agreed to.

The STOCKPORT CORPORATION WATER Bill was returned from the Commons, with the amendments agreed to, with amendment. The said amendment considered, and agreed to.

The SOUTHPORT WATER Bill was read a third time, with the amendments; further amendments made, passed, and sent to the Commons.

The HERNE BAY WATER, and the PETERBOROUGH WATER Bills, were read a third time, with the amendments, and passed, and sent to the Commons.

The PLYMOUTH CORPORATION WATER, &c., Bill, was reported, with amendments.

The DUNDEE NEW GAS, and the DUNDEE GAS Bills, were read a third time, with the amendments; further amendments made, passed, and sent to the Commons.

A petition was deposited against the EAST LONDON WATER (THAMES SUPPLY) Bill, from the Conservators of the River Thames.

HOUSE OF COMMONS.

MONDAY, MAY 27.

The HEYWOOD IMPROVEMENT, and the MOLD GAS AND WATER Bills.—The Lords amendments were agreed to.

The MITCHAM AND WIMBLEDON GAS, and the WEST KENT GAS Bills, were read a third time, and passed, with amendments.

The LAMPETER, LLANDYSSIL, &c., GAS Bill.—Report, that the Standing Orders not previously inquired into have been complied with, laid upon the table.

The METROPOLIS GAS Bill.—The petition of the Westminster District Board of Works, praying to be heard against the Bill, referred to the Select Committee on the Bill.

TUESDAY, MAY 28.

The WIDNES GAS, WATER, AND IMPROVEMENT Bill was read a third time, and passed.

The GREAT GRIMSBY GAS Bill was reported, with amendments.

WEDNESDAY, MAY 29.

The FARNWORTH PARK AND IMPROVEMENT Bill.—The Lords amendments were agreed to, with an amendment.

The ABERTILLERY GAS AND WATER Bill was read a second time, and committed.

THURSDAY, MAY 30.

The CAMBRIDGE GAS, and the ROCHESTER, CHATHAM, AND STROOD GAS Bills.—The Lords amendments were agreed to.

The HUYTON AND ROBY GAS Bill, as amended, was considered.

The EAST LONDON WATER (THAMES SUPPLY), and the EAST LONDON WATER (VARIOUS POWERS) Bills, were reported.

FRIDAY, MAY 31.

The RICHMOND GAS Bill, as amended, was considered, and amendments made.

The METROPOLIS GAS Bill.—Petition of vestry of St. Marylebone, praying to be heard by counsel against the Bill, referred to the Select Committee on the Bill.

MONDAY, JUNE 3.

The HUYTON AND ROBY GAS Bill was read a third time, and passed, with amendments.

The EAST LONDON WATER (THAMES SUPPLY); EAST LONDON WATER (VARIOUS POWERS); and the GREAT GRIMSBY GAS Bills, as amended, were considered.

The LAMPETER, LLANDYSSIL, &c., GAS Bill, was read a second time, and committed.

The ABERTILLERY GAS AND WATER Bill.—Report on petition for additional provision, that the Standing Orders have been complied with, laid upon the table.

The GAS COMPANIES (METROPOLIS) accounts presented, relative thereto (by Act), to lie upon the table.

TUESDAY, JUNE 4.

The SHEFFIELD WATER (AMENDMENT) Bill.—The Lords amendments were agreed to.

The RICHMOND GAS Bill was read a third time, and passed, with amendments.

THURSDAY, JUNE 6.

METROPOLIS GAS, &c., Bills.—Mr. Cardwell reported from the Select Committee on the Bills, that the committee had adjourned to Monday, the 17th inst., at twelve o'clock.

The DARTFORD GAS, and the GREAT GRIMSBY GAS Bills, were read a third time, and passed, with amendments.

The EAST LONDON WATER (THAMES SUPPLY), and the EAST LONDON WATER (VARIOUS POWERS) Bills, were read a third time, and passed.

FRIDAY, JUNE 7.

The SHEFFIELD WATER (NEW WORKS) Bill.—The Lords amendments were agreed to.

The STOCKPORT CORPORATION WATER Bill.—The Lords amendments were agreed to, with an amendment.

The METROPOLIS GAS Bill.—Petitions against the Bill, from Crawshay Bailey and Rev. Thomas Evans, Rector of Goybre, referred to the Select Committee on the Bill.

HOUSE OF COMMONS.

METROPOLIS WATER SUPPLY.

THIRD DAY—THURSDAY, MAY 16.

The CHAIRMAN stated that he was desired to intimate that it would be convenient that the whole of the evidence which counsel proposed to lay before the committee, with reference to the river Lea system of supply, both in the metropolis and elsewhere, and as regarded its sources and means of supply, should be completed before anything was gone into with reference to a supply direct from the Thames, or from other sources.

Mr. *Charles Greaves* recalled, and further cross-examined.

Mr. CRIPPS: Can you tell me whether the constant supply or the constant system are terms well understood, or to be explained by you as a water engineer, and whether they mean a supply with the intervention of cisterns or without them?

Witness: I cannot answer that question simply and indefinitely. A constant system means that the pressure shall be always in the pipes down to the house in which the water is to be consumed, but I do not think it has ever been settled whether it should mean with a cistern or without it. We read the Metropolis Water Act as implying that there should be a cistern in every case. I cannot answer the question definitely, it would require a further question for elucidation.

Mr. CRIPPS: I will just call your attention to the report of the Commissioners for the Prevention of Pollution of Rivers. The last paragraph in their recommendations is—"That legislative measures be passed to render it compulsory upon each company to supply water upon the constant system throughout its district, and upon owners of houses to furnish their houses

with proper arrangements to receive such supply." Should you understand that recommendation, or would it require something more to convey to your mind what that is intended to apply to?

Witness: It requires to be further defined.

Mr. CRIPPS: Would it not go to the end that all your mains should be charged at full pressure?

Witness: They are now; there is a charge at full pressure to all the pipes except the service-pipes, and at all times except when repairs are required, or special shutting down for particular works.

Mr. CRIPPS: Suppose that in a house the ball-cock was put down at any time in the day, would there always be a supply of water forthcoming?

Witness: Not for houses on the intermittent supply; the services on the intermittent supply are only charged during the time of the supply. Assuming the constant system, as spoken of in the report, to be adopted, then all the pipes, except the communication-pipes, would have to be charged at full pressure: that is precisely the difference. With the constant system, the point in the pipes to which the pressure would always be existing would be up to the ball-cock of the cistern.

Mr. CRIPPS: That is not so under your system, except in those exceptional cases of houses which you mentioned yesterday?

Witness: In those 25,000 the pipes are fully charged up to the ball-cocks of the cisterns, but excepting in those it is not so.

Mr. CRIPPS: Again I refer to the report of the Registrar-General with regard to a matter that you spoke of yesterday—the water-pipes; it is in these words—"Whoever will take the trouble to go among the people now suffering in crowded dwellings will see the danger of the water-butt; poor women are washing the dirty linen of patients with water drawn from those vessels, which are often found close to the water-closets. It would be a source of additional safety to London if the tanks and butts were all abolished, and the pipes were filled on the system of constant supply. The time has come for this reform." That must mean also all the pipes being charged at constant pressure, communication-pipes, and all?

Witness: Yes.

Mr. CRIPPS: Some evidence was given to the committee of the cost which any alteration would occasion to landlords by changing the present system to the constant system of supply; have you considered what the cost would be?

Witness: Yes, I have considered the cost, but I should rather wish to be excused from naming one which would fit all London, as the East London district is so different from other parts. Taking our own district, and assuming that in houses of the class we supply there was a tap and a constant supply to that tap, I do not see how the cost could amount to more than £2 a house. I doubt whether it would amount to so much as that. I do not think it would be wise to put it as low as £1, because we should use the opportunity for enforcing a better condition of cisterns and better apparatus all through; there is very little doubt that in the majority of our districts the water-closets use two-thirds of the domestic supply of water. I dare say it might be done for £1 if the water-closet question were separated from it.

Mr. HEADLAM: I did not understand what you said with regard to the intermittent system. Did you say that there is both a communication-pipe and a service-pipe?

Witness: On every system the whole set of pipes may be divided into three—the mains, the services, and the communication-pipes. The mains are always charged; the service-pipes will be always charged on the constant system, but only intermittently charged for certain hours and minutes in the day on the intermittent system; communication-pipes will follow service-pipes, and be constantly charged with the service-pipes on the constant system.

Mr. HEADLAM: To how many houses does one service-pipe apply, and is there one communication-pipe for every house?

Witness: There are 30, 40, 50, or 60, according to the circumstances and size.

Mr. HEADLAM: What degree of labour is required in putting on water on the intermittent system?—how many cocks have to be turned to cause the supply to come into the different houses?

Witness: Only one cock is required to be turned for, it may be, 30, 40, and from that to 60 houses, for as many houses as the service-pipe applies to. The service-pipe runs parallel with the houses and parallel, probably, to the main pipe, if there is one; but in a branch street without a main it would be at right angles to the main in the next street.

The CHAIRMAN: I think now we understand that the service-pipe and the district main mentioned in the Act of Parliament must be one and the same thing.

Witness: I have interpreted the service-pipe and district main to be the same thing, but I think I am going a little on one side of the interpretation intended. I think by the Act it was intended to give a larger geography to a district main than I have given to it.

Mr. KEKEWICH: I do not think the words "service-pipe" are used in the Act.

Witness: No; there are "communication-pipes," "mains," and "district mains."

Mr. CRIPPS: We assume that the district main and the service-pipe are mains for the same thing. He gives a new name to the pipe called the "communication-pipe" that comes into the house.

Re-examined by Mr. CLERK: The communication-pipe is a term used in the Water-Works Clauses Act, 1857.

Mr. CLERK: That (handing the same to the witness) would represent, would it not, a section of what you would call practically a service-pipe?

Witness: Yes; it is a 3-inch pipe, and has a connexion with the house. The main is larger than that, and one cock stands between them and the main. It is to the service-pipe that the communication-pipes are attached. We do not as a rule attach communications to either the large or the small mains. We sometimes speak of a house being on the main, and in that case some houses are supplied by meter with larger quantities of water directly from the main; but the expression "on the main" is on old-fashioned one, and before the expression "constant supply" became a common one, people used to talk about being on the main or getting on the main, and they thought it a fine thing to have an opportunity of pulling away as much water as they chose. When we give that modified constant supply which we do give in our district, it is at the connexion between the communication-pipe and service-pipe that we put in the controlling orifice. No limit is imposed by the company, when they use that system, as to the size of the cisterns or the receptacles in the house. My desire is that every house should have a 49-gallon cistern. We try to lead them to that as much as possible, and if a man was asking to have water laid on to a house with no more than a 10-gallon receptacle in it, I should refuse to do it.

Mr. CLERK: Would the average cost of £2 a house include a change of the leaden pipe, a fresh communication-pipe, and other fittings?

Witness: It would merely apply to a change of some part—the communication-pipe and an improvement of the ball-cocks and draw-cocks. In many cases a new cistern and complete apparatus would be required, while in other cases the existing apparatus would be sufficient. Without such a change as this, and if the waste pipes were removed, there would be great flooding, inconvenience, and enormous waste; and I have no doubt it would be very prejudicial in the houses. That was pointed out by one of the medical inspectors in the East of London, Dr. Liddell.

Mr. CLERK: Supposing this change to take place of giving a constant pressure by means of taps in the houses, would it still be necessary to have cisterns as well in the majority of those houses?

Witness: I do at not all see how water supplied on the constant system can be worked without a cistern. In the larger part of the East of London water-closets are found to a great extent. I have not by me the per centage, but I think I returned to the River Commissioners that I had counted up 46,000 water-closets in 82,000 houses. I do not know of any case where a constant supply is given where there are not cisterns in connexion with the water-closets. I consider that a pipe might be made large enough to carry a sufficient flush into a closet, but such a condition of things as to have a cock in a water-closet, being as it were a secret delivery of water, it would not do; it would be running all night in every house without any control. I think it would be the maddest kind of arrangement possible. I think the system that I suggested to the committee yesterday is the best mode of securing that houses should be well fitted, that there should be a license granted to the owner, or a license required for him before any house was occupied; that would very effectually strike at the root of all the difficulties that now exist, The companies at present are powerless to enforce proper fittings in the houses, and also to enforce the taking on a supply of water. If there is waste or misuse of the water, we have power to cut off the supply.

Mr. CLERK: You have no power of enforcing a sufficient sized receptacle being put up?

Witness: There is some receptacle, but it is not sufficient, and it requires very arbitrary action to carry that out to the fullest extent.

Mr. CLERK: You suggest that no house should be occupied until such a license was granted, and that if there was not a sufficient receptacle provided for the water there should be power given to withdraw the license?

Witness: That should be one of the items of approval; but there are many other grounds on which many houses in London should be declared uninhabitable besides a deficiency in the supply of water.

Mr. CLERK: My learned friend yesterday seemed to think that there would be the same liability on the part of the owner to have the fittings stolen when there was an intermittent service as when there was a constant service. With the intermittent service at the present time, are there any brass fittings at all in those houses?

Witness: Yes; but in many cases there are not. The water is turned on for a certain time from the main to the service-pipe to fill the tub or butt, or whatever the receptacle may be, but still we demand the fixing of a ball-cock in any case. But there would be a much larger amount of fittings required in the system of constant service than are now necessary. If a neighbourhood, or a district, or a block of houses is so badly fitted and kept that they have no ball-cocks or cisterns, it would be madness for us under present circumstances to attempt to give them any kind of continuous supply while they are in that condition. It is very important and advisable in all cases to have a cistern.

Mr. CLERK: Then there was a point referred to yesterday which my learned friend on the part of the Board of Works did not seem to appreciate, as to what you propose to do with the reservoirs under your bill of the present session. I believe that the uncovered reservoirs are on a different side of the river Lea from the covered ones?

Witness: Yes; the river Lea runs between them, the uncovered ones are on the eastern side of the river Lea, and the covered ones on the western side. It is the uncovered reservoirs that we propose to fill up, with the exception of a small receptacle for the surplus water. And on the west side we propose to fill up the whole of one of the covered reservoirs which is in gravel, retaining a part of the one which is in clay, in order to prevent all chance of breakage or soakage into any part of the reservoir.

The CHAIRMAN: Can any one of the learned counsel give the committee an explanation of what is meant by "constant supply in other towns," and how it is conducted, for at the present time I am afraid we really do not know what we are asking about? I am now referring to the sentence used by Dr. Farr, which you will find at page 3; he says—"It would be a source of additional safety to London if the tanks and butts were all abolished, and the pipes were filled on a system of constant supply. The time has come for this reform." That suggests a system without tanks or butts, and no intervening storeage between the company's supply and the consumers use of the water. Can you give the committee any information as to what constant supply means, otherwise we may have to recall these witnesses in order to get that information, because these are practical gentlemen?

Mr. WILKINSON: The Metropolitan Board of Works propose to call Mr. Bateman, the originator, I believe, of the constant supply system, who will explain fully to the committee the entire mode.

Mr. HEADLAM (to the witness): How far does the property of the company extend; do the mains belong to the company?

Witness: The property of the company ends with the iron service-pipe belong to the company, the communication-pipe is the property of the owner of the house, it is laid down at his expense, and kept in repair.

Mr. KEKEWICH: Is the communication-pipe always made of of lead?

Witness: No, iron is sometimes used, but it is not good; lead is the best; although liable to burst in time of frost, it is more durable than iron. We do not lose much water by the bursting of the pipes, the principal waste is in consequence of the deficient construction of the water-closet apparatus, and from the water being allowed to run down; two-thirds of what goes to the domestic supply is so consumed, only one-third of it is consumed for cooking and drinking.

The CHAIRMAN: Will you be good enough to state where your first point of contact is with the New River Company's works or system of supply?

Witness: We have no exact contact in the way of receiving a supply but in point of distribution, the line as between the salmon colour and the grey on the map behind me is the division line between us.

The CHAIRMAN: Do the mains come together at any of those points?

Witness: Hardly; the service-pipes do, not the mains.

The CHAIRMAN: How far off are your mains from their reservoirs?

Witness: We have a different focus entirely. The focus of one of the largest mains is at Old Ford; our second focus, which is not so large, is at Lea Bridge. The focus of the New River supply is either from the New River head or the two reservoirs above at Stoke Newington; that is, I think, a mile and a half from our reservoirs at Lea Bridge—that is the nearest point.

The CHAIRMAN: Are not your reservoirs at Tottenham?

Witness: No, they are at Walthamstow, but they have no apparatus of supply.

The CHAIRMAN: Is there any objection to your receiving all that you require from the New River?

Witness: There is no mechanical or physical objection. If the quantity of water which the East London Company now receive and distribute had to be taken out of the river, where it could be conveyed down the New River, there would be the whole question raised about the Government powder works and mills, and all the mill property between the present source of the New River and the present East London Company's Works.

The CHAIRMAN: You take the water from the river Lea do you not?

Witness: Yes, at a place many miles below the point where the New River Company takes it.

The CHAIRMAN: Between those two points it appears, from the report of the River Commissioners, that there is a great deal of deleterious matter put into the river Lea?

Witness: The proportion of population below the source of the New River is not very different from the proportion of population per mile above the source of the New River.

The CHAIRMAN: Therefore you would still have the additional increments of all the population intermediate?

Witness: The additional water and the additional population.

The CHAIRMAN: What is the additional water that comes into the Lea, below the place where the New River Company takes its water?

Witness: So much as there is at that point. The two tributaries enter the river Lea below the point where the New River Company take their supply. The river has large springs in it, and it receives a large increase of volume in going down the valley. The two tributaries to which I now refer are the Ash and the Stort, on the eastern side, both of which fall into the general system, below the point where the New River take their supply. The volume of water that is delivered by those two tributaries is very considerable. I cannot give you the figures offhand, but they are sufficiently well known. I will obtain them for you.

Mr. HENRY BAILLIE: Is the Stort water a very impure water?

Witness: It is not a first-rate water; it is rather more impure than the water of the Lea at the point where it joins. The Ash water is very pure; it falls in about a mile and a half or two miles below the place where the New River Company take their water. The intermediate town of Ware discharges a considerable amount of pollution into the river Lea. The whole of the drainage of Ware comes into the Lea. There is no system of purification whatever. I should think that the drainage from the town of Ware might very easily be intercepted and prevented from going into the Lea, and that of the town of Stort more easily. That sewage might be readily distributed on the land and turned to beneficial purposes.

The CHAIRMAN: What objection is there, if the water of the New River is purer than yours, and the New River is capable of supplying a much larger quantity than is wanted, to your drawing the water from the New River into your reservoirs?

Witness: Because that would lead to casting aside the whole of our existing works. If the plan were to carry all the water down the course of the New River we should have, to a certain degree, a higher level.

The CHAIRMAN: Would not that rather facilitate the discharge of the water into your reservoirs?

Witness: It could flow from there to the existing reservoirs.

The CHAIRMAN: What objection is there to having the water from the New River if it be better than the water in the river Lea, where you draw it from?

Witness: The difficulty is in getting it into the New River, and then bringing it along its source.

The CHAIRMAN: If we had been told that a very much larger supply can be obtained from the river Lea below Hertford, and that the New River will convey down twice as much as it does at present, what objection is there to your receiving that water?

Witness: I cannot admit that there is that capacity in the New River to take in or to carry on that quantity. But this is a question that is not new; for even as far back as 1852 the same matter was mooted and fully considered, and I do not know but what if there had been a large volume of water in the upper valleys of the Lea, it might not have resulted in something before; but the utter impossibility of collecting a large quantity of water in the upper parts of the Lea, and the impropriety of cutting off the whole of the lower valley of the Lea was so evident that we continued as we were.

The CHAIRMAN: Was the New River Company ready to give you the water, and did you decline it?

Witness: I say they have not got it. I have lived on the banks of the river for some time, and I have studied it for many years, and I know that very large works would be wanted to supplement the flow of the New River to the reservoirs; indeed, I am sure that all the reservoirs you could make upon the Lea would not allow of the whole supply for the two companies coming down by that course. We had the question of the storeage of water under consideration from year to year, and we have been continually thinking where the best places would be for the construction of reservoirs. I mean reservoirs in places of security, where the least damage to property would be done, and the least interference take place, and all those matters. My conclusion upon the subject was that the place where we have begun to make a storeage reservoir is the best place now—that is, at Walthamstow; but there are sites above Walthamstow where reservoirs could be made. I do not think there is any one place where a vast reservoir could be made—that is, to carry out the whole operation on one site; and I think it would be best carried out by having a series of reservoirs.

The CHAIRMAN: Supposing the objections to the Stort River were to prevail, have you considered the expediency of having a storeage of water higher up, so as to cut off, or to draw your water above all the impurities flowing in from the suburban population on the river?

Witness: Quite so. As I have already stated, in 1853 we came to Parliament with a plan for taking the whole of the supply at Field Weir, and it was nothing but the determined opposition of the Government which cast that plan on one side, that is, at the junction of the sixth tributary.

The CHAIRMAN: The New River Company can take water which would be enough for themselves, and they have done so at the place where their river joins the river Lea, have they not?

Witness: I do not think so, nor do I think the water is there; indeed, they have even got subordinate apparatus in the lower part of the Lea to supplement that upper supply at Tottenham, and the apparatus is used when occasion requires. They have taken water from the Lea at Tottenham. I do not know what the continual process is, or what the quantity taken is, but there it stands, and it is kept in order to do so when necessary.

The CHAIRMAN: What has the Government to do with the construction of works at Field Weir? What is their objection?

Witness: Because there are the whole of the powder-mills at Waltham Abbey, which were worked by water, and are almost entirely worked by water now, as also the small ordnance factory at Enfield, which is very much dependent upon water power. I do not recollect now how many horse power the water power there represents, but I am aware that the power was cut up into a great number of wheels, so that the different operations in the making of gunpowder might be carried on detached from one another. The Government rely upon the manufacture of gunpowder at Waltham Abbey, as maintaining a high sample for powder, and as ruling the quality with the traders and manufacturers.

The CHAIRMAN: Are the committee to understand that the Government objected to your drawing water at any place above Enfield?

Witness: The objection entertained is against our drawing water anywhere above the powder-works. The head of them is at King's Weir.

The CHAIRMAN: With reference to that clause which enables the local authorities to require that the supply of water provided should be given at 3*d.* per week, is that clause, in your opinion, applicable to the ordinary run of houses in London which are let out in lodgings?

Witness: I think it applies to such houses as two roomed houses; generally speaking, a 5 per cent. house, and 20 per cent off for discount. It would be 18*s.* a year water-rate; the rent would be about £15 a year, and would come within the operation of that clause. There are a good many houses in our district of that annual value. The houses that suffer most from a short water supply are the houses which stand in courts with no back yards, and where the poor people fetch their supplies from one pipe in the front, and where they have no means of storing the water. That clause does not give the local authorities power to control the water supply in such houses, because they are let at a higher rent, there being a great demand for houses in such places. Every room is inhabited, and frequently by a family. To ensure a water supply in the houses that are let to numerous tenants at a higher rental than £15 per annum, it would be necessary to make some alteration in that clause to extend its operation; but I do not think that the machinery of the clause could be adopted, because we find now that houses which were formerly very respectably occupied are now so cut up into separate lodgings, and so stuffed with people, that they are no longer poor houses. But still the apparatus for supplying water is quite inefficient. Assuming that the clause was extended to all houses, it would come, I think, to this—that the local authorities should have the charge of seeing that every house was properly supplied with water, and that would be putting all houses under the same *régime* as under the Lodging House Act of last year.

Colonel HOGG: Have you ever put any pipes in subways?

Witness: Not in any extensive way. We have a few passages which are called subways—underneath railways, for instance. If a pipe was once placed in a subway, of course the expense of pulling up the streets is avoided, and, therefore, it would be a saving to the company; the interruption to the streets would also be diminished.

Colonel HOGG: Do not you think that extra power is required to oblige landlords of houses to furnish cisterns in the poorer districts?

Witness: Yes; I think that they ought to be put under stronger compulsion than they are now. I think that the local authorities ought to have greater power to oblige landlords to put up cisterns. I think that they ought to have not only the power to do it, but that they ought to make it their duty to do it. They possibly have the power now, but the duty is not compulsory, and therefore it is not performed.

Mr. KEKEWICH: Are slate cisterns used to a great extent?

Witness: Yes; to a very great extent, and they are very good, but the majority of cisterns now-a-days are deal cisterns lined with zinc.

Lord FREDERIC CAVENDISH: I understood you to say that the population and the drainage into the Lea below the source of the New River was about the same as the population above that source?

Witness: There is rather a larger population per mile. There is no great difference in quantity of additional water coming into the river below that source and above.

Lord FREDERIC CAVENDISH: I see by the report of the River Commissioners, that whilst in the water of the Stort the organic contents were 1·37 grains per gallon, in the water of the Ash the grains were 2·10. Those are the two chief tributaries?

Witness: Yes; and I cannot account for so large a proportion as that in the water of the Ash, inasmuch as it is as rural a stream as any of the tributaries of the Lea.

Lord FREDERIC CAVENDISH: And the result is that the solid residue in the Lea at the point of diversion for your water-works is ·97, or double that of the New River. Have you ever analyzed this water?

Witness: Frequently. Those samples were, I believe, only taken once, and they say that the water was in flood at the time, and therefore I do not think the sample of the water at all a fit one upon the question of impurity.

The CHAIRMAN: Will you explain to the committee how the construction of reservoirs which would merely receive the flood water of the river Lea above Enfield could interfere with the use of the river for the purposes of the Government?

Witness: It would not interfere at all, if the waters to be retained in them were merely flood waters which the Government might very well spare, and there is legislation already provided by which they could be compelled to spare that water.

The CHAIRMAN: If the object of those reservoirs is merely to impound the flood water of the river, the objection would not hold good that you have stated on the part of the Government.

Witness: Quite so; but impounding the flood water for the supply of London, would take us into works that I do not think we could meet in any way.

The CHAIRMAN: The object of these reservoirs is to carry off a greater amount of water than the average flow, is it not, and not to be simply to take into the reservoirs the ordinary flow of the river?

Witness: If you can take into the reservoirs the water above the point of contamination, and if you can compensate all the millers who have had the use of the water below, you would get an improved supply.

The CHAIRMAN: You would not, I suppose, construct a reservoir for the purpose of putting into it the ordinary flow of the river. The object of making a reservoir is to take out of the river the extra quantity of water that is in it at any time. Whenever the water rises to a certain point they take up the flush-board and let the water through, do they not, so that what you impound is all the water that would go to waste?

Witness: Yes; and which may now be considered to be detrimental, for as long as the river is in a state of flood the mills are stopped, if it is a heavy flood. It is the object of a reservoir to take off the flood water, on

the assumption that if there is a flood at one time of the year there will be dry weather at another, and so we get at the average supply throughout the year, and that is the object of a reservoir for impounding the water.

The CHAIRMAN: To prevent your using for consumption in very dry weather, water in which the proportion of flowing water is very much smaller than the foul water, and therefore the whole is very much worse.

Witness: It is so, but you are dependent under that system upon the occurrence of floods every year, which is, I think, hardly a safe view to take.

The CHAIRMAN: Not necessarily, because supposing floods were to occur in one year, and your reservoirs were filled, that storeage would remain until the occasion came for using it.

Witness: Then your store of water must be very greatly in excess of your consumption.

The CHAIRMAN: Is that necessary? Is not the stored water used to some extent in aid of a certain amount of supply—that is to say, have you not always your 30 millions of gallons, and the use of the storeage is to give you 3, or 4, or 5 million gallons a day in aid?

Witness: Supposing you draw upon that storeage in aid in one season, and you have a drought in the following one, and you do not replenish your reservoir, where would you be in the next season? We had such a year as that in 1864, when reservoirs beyond a certain size would not have been capable of being filled; and we have had dry winters with scarcely any flood—that is to say, the frost and snow have melted away without any flood. As a matter of engineering I should be sorry to put myself in dependence upon storeage waters as long as there were running waters near at hand. If they were in addition, then they would be a beneficial addition to the establishment and to the means of supply. If any effort is to be made to utilise the redundant waters of the Lea, I think it very immaterial whether the two companies join or whether they do it separately.

Colonel HOGG: You have given it as your opinion that by means of storeage reservoirs you may secure in dry seasons 10 million gallons a day for 50 days?

Witness: Yes, I have, and 500 million gallons in all.

Mr. KEKEWICH: Do you think it would be possible to obtain a greater supply of water from artesian wells; I see that one of the companies gets its water entirely from those wells?

Witness: Yes; they are very fortunate in being situated in a district that is very prolific of water, and they get as much as they require by increasing the number of the wells—the Kent Water-Works Company. We have endeavoured to find water by boring into the chalk within our district, but the chalk appears to be of a different nature, and it is not so prolific of water as in the Kent district. If there were any signs of any abundance of water in our district we should immediately take more measures to get it. The upper tributaries of the Lea are entirely on the chalk.

Mr. ASHLEY: In your cross-examination, in saying that you were in a company which was in the habit of taking water from Tottenham, are you aware that for the last two years they have not taken any water there at all, and that before that time it was quite occasionally that they did so?

Witness: I do not know the precise dates; I do not know exactly the last date when they did so.

Mr. DENISON stated that he proposed now to call Mr. Simpson, as representing the Thames companies.

After some discussion the committee assented to this course being taken.

James Simpson, Esq., examined by Mr. DENISON.

I am a water engineer of great experience, as my father was before me. I have been engaged in one way or another with reference to most of the great water schemes which have been promoted in Parliament for many years past, and particularly I remember the various inquiries which have been made from time to time about the metropolis water supply. I was engaged in the bill of 1851, and the inquiries of 1851 and 1852.

Mr. DENISON stated that he presumed that on these matters the statement of Mr. Hope Scott would be taken as sufficient.

The CHAIRMAN stated that all the official documents to which Mr. Hope Scott referred would be accepted, and requested that a list of those documents, with an official reference, might be furnished to the committee.

Mr. DENISON (to witness): Were you examined before those committees?

Witness: I was. In 1851, Sir James Graham's committee approved of the New River, the Lea, and the Thames as proper sources of supply. Lambeth had moved to the upper part of the Thames in 1848. 600 million or 700 million gallons a day may be taken as the general flow of the Thames, but occasionally during floods it is very much more. This is at Hampton. That average would be a good deal higher than the 600 million or 700 million gallons. We have no very good account of the average flow of the Thames, but we may judge that it is very enormous; it probably at times may be from fifty to sixty times the ordinary flow. My observations have been made on the summer level of the water, and we have had floods 11 feet 10 inches above the summer level, which flood a very large tract of country, and which increase the volume of the river very much indeed. Again, in dry seasons we have had them very much lower—2 or 3 inches below the summer level—and at that time the quantity, exclusive of what the companies take, has been about 380 million gallons; that is the lowest, I believe, that has ever occurred on the Thames. In my opinion, there is quite sufficient water in the Thames for all the present purposes of the companies for 40 or 50 years; it is one of the largest streams in this country, and a stream which is very valuable, inasmuch as the volume of it is large, and is not likely to be affected by any but the heaviest showers. I am assuming, when I say that I think there will be enough for 40 or 50 years to come, the rate of increase of population to be rather less than 2 per cent. That works out to a doubling of the population in those forty years. This is almost an inconceivable assumption. It is almost impossible to assume an increase at the rate at which we have been going on. It would bring us, at the present state, to about 6 million. As to the quality of the Thames water, my opinion is that it is very fine water—as good as you can get in this district. 16° of hardness is the highest. There are some seasons when the Thames is only 12° of hardness, and when it is boiled it comes down to about 4°. The majority of the water which is used for drinking is boiled. There is a prejudice in favour of very soft water on the part of some people, but I consider hard water is better for keeping, and in many cases I should say it is better for drinking; and I think that the great object in supplying a large town should be to get water which is generally good water for the purpose, and I confess that I do not approve of the softest waters; they are very liable to act on leaden pipes, and a great deal of mischief like that may ensue. I was called in in the case of Claremont, where the French family were poisoned, and it was said to be a very fine water; it was soft water, but it was very injurious there. Again, I was called in at the dog kennel at Windsor, and there all the dogs were affected by it, and I believe that the keeper was affected; but certainly the dogs were liable to paralysis of the feet. We had this peculiarity in the experiments and the chemical analyses which were then made, that by passing the water through sand filters, even with a small quantity of lime in it, the lead was all right again, and the water was very good and wholesome; and I may mention that it is a curious effect that every time they filtered that water it seemed to get a degree harder. There are two ways in which water is made hard: one by having carbonate of lime in it, and the other by having sulphate of lime—the carbonate of lime boils out, the sulphate of lime does not. The Thames water contains a very small quantity of sulphate of lime, and it is so far beneficial that that is the protection against lead pipes. Some years ago I had to do with the supply of gentlemen's estates and mansions, and that led me to go into a very particular analysis of the water. Professor Brande was then in the habit of analyzing for me, and his report always was that if the water contained even a trace of sulphate of lime, it was a sufficient protection against the effect of lead pipes. The majority of the stuff which makes the Thames water hard is carbonate of lime, which boils out, and is the white stuff in kettles. A large quantity of water comes from the springs in the chalk and from the oolite, both of which contain a quantity of carbonate of lime. Another thing which was stated as an advantage of soft water was, that it made very much better tea; but I think that really was a fallacy of the Board of Health, because everybody knows that when you boil water it begins to deposit at about 180°, and it gets down; and practically, although you may call it hard water, when it is in the teapot it is soft water, and very seldom have I seen that water analyzed to less than 5° of hardness, and very often only 3°, which is practically as soft water as you can get. Another of the fallacies of the Board of Health was, that we were to be saved (I think they went so far as that) a million a year in soap, but I think those were mere assertions. There was no ground for it. No doubt there is some economy in the use of soft water, but if you apply it to the whole quantity used that is a mistake. We do not want soft water for washing yards, and a variety of purposes of that kind, and the majority of the washing is done with hot water, of course, so that that water has become soft. In Paris they have decided that water which is moderately hard is much better for the supply of the city than soft water; and in fact, they have gone to a district there which is a limestone district, for the very purpose of getting hard water. I believe that the water there is very nearly like our Thames water, but not quite so hard.

Mr. H. BAILLIE: Do you know what is the quality of the water in the great artesian well of the plain of Grenelle? Is that a soft or a hard water?

Witness: That is a soft water from the ingredients which it contains. All those waters contain a large portion of carbonate of soda; but there is a popular delusion about those deep-spring waters being so pure. They are really not so. Chemical analysis proves that they are anything but pure, and the softening properties which they contain are due principally to the carbonate of soda; but they really are impure waters. They no doubt have mineral elements in them from percolating through different soils. Rain water is soft, but I believe that in many cases we have to distrust even rain water, especially as it comes off houses. It is not pure. It contains a good deal of nitre. When I was surveying officer at Leicester, examination proved that venal diseases were very common in consequence of it. I saw that they had means of turning taps, so that they let the first washings go away; but still it was not pure water. The cause of the action of soft water upon lead is a chemical action from exposing fresh surfaces, and is not controlled by any chemical means. They have a means of manufacturing white-lead—which was stated to be the carbonate of lead, the white-lead of commerce, but it is not so; it is the acetate of lead they make, and that is done by turning over fresh surfaces of lead exposed to water, and washing off the surfaces from time to time.

Mr. HEADLAM: Were there any mineral contents in the water recommended by the Board of Health from Bagshot Sands, or had it been purified by passing through the sand merely?

Witness: Some of the springs contained in it; but generally speaking it was due to the very deep filtration of the Bagshot Sands; but there, I think, independently of the quality, the water would have probably failed. That water would have acted upon lead. There was very little mixture of mineral matter in it; some of the springs were bad. Now the springs about Farnborough are very pure; in fact, they are all of the green sand—it is a beautiful water. The theory of arterial water was tried at Rugby, under the direction of the Board of Health. It was a long while before they got any water at all, and when they got it it was salt water, and now they go to the river, and draw from the river, as they do in other places. There is great difficulty in that district in obtaining water. In some cases in the Oxford clay you get sulphuric acid, and it is not at all an easy problem to solve.

Mr. DENISON: I think that I may now go to another point. Now, about the works on the upper navigation. In 1865 we know that they were in a very bad state, and that led to a bill. You were examined before the committee, were you not?

Witness: I was; and, therefore, as far as that went, helped to pass the Thames Navigation Act of 1866. I reported to the Government upon that as far as I was connected with the supply of Windsor Castle. The Government have a very fine water-wheel there, and I was under an apprehension at one time that the whole would be swept away, the works were in such a state. I gave evidence also before the commission which sat on the same subject. Each of the five companies which take from the Thames offered in the committee to pay an annuity of £1000 a year, besides what they did before, towards the operation of that bill—viz., getting the Thames purified. That will carry the purification of the Thames up to Cricklif—I think something like 150 miles by the course of the stream. Assuming that that Act is acted upon by the conservators, the Thames will be very considerably better than it is at present. It is coupled with this fact, that they prevent the sewage being thrown into the river. I know that many persons have an idea, in consequence of the large population up there, that the river is now fouled to a great extent, but that is not so. It is a very small population comparatively, as you may see in travelling over the country, and the Thames water above Oxford is very pure indeed. It has been proposed to drain Oxford and Reading, and some of the larger towns which are not drained now, but that bill would stop it. I do not think it will affect the hardness of the water at all, but it will prevent the increase of organic matter, which is a very important thing.

Mr. H. BAILLIE: Does the bill apply to the Colne?

Witness: Within three miles of the main stream.

Mr. DENISON: With regard to the pollution of the water, these are the clauses:—"From and after the passing of this Act, it shall not be lawful for any person to do any of the following things—viz.: (1) To open into the Thames any sewer, drain, pipe, or channel, with intent or in order thereby to provide for the flow or passage of sewage, or of any other offensive or

injurious matter.—(2) To cause, or without lawful excuse (the proof whereof shall lie on the person accused) to suffer, any sewage or any matter aforesaid to flow or pass into the Thames down or through any sewer, drain, pipe, or channel, not at the passing of this Act used for that purpose.—(3) To open into any river, stream, cut, dock, canel, or water-course communicating with the Thames, at any point within three miles of the Thames, measured in a direct line therefrom, any sewer, drain, pipe, or channel, with intent, or in order thereby to provide, for the flow or passage of sewage, or of any matter aforesaid, in such manner that the same will be carried, or be likely to be carried, by, through, or out of that river, stream, cut, dock, canal, or water-course, into the Thames.—(4) To cause, or without lawful excuse (the proof whereof shall lie on the person accused) to suffer any sewage, or any matter aforesaid, to flow or pass into any such river, stream, cut, dock, canal, or water-course, at any point within the distance aforesaid, down or through any sewer, drain, pipe, or channel, not at the passing of this Act used for that purpose, in such manner that the same will be carried, or be likely to carried, by, through, or out of that river, stream, cut, dock, canal, or water-course into the Thames." Then there is a power of summary conviction, and then comes the discontinuance of the present sewage. Clause 64 is as follows:—"Whenever any sewage, or any other offensive or injurious matter, is caused or suffered to flow or pass into the Thames; or is caused or suffered to flow or pass into any river, stream, cut, dock, canal, or water-course communicating with the Thames at any point within three miles of the Thames, measured in a direct line therefrom, in such manner that the same is carried, or is likely to be carried, into the Thames, then, and in every such case, whether any such sewage, or other matter aforesaid, had or had not been so caused or suffered to flow or pass before the passing of this Act, the conservators, within a reasonable time after knowledge of the fact, shall, and they are hereby required to give notice in writing, under their common seal, to the person or body causing or suffering the same so to flow or pass, to the effect that they require him or them to discontinue the flow or passage thereof as aforesaid, within a time to be specified in the notice, not being, in any case, less than twelve months or more than three years; provided that the conservators may, if they think fit, at any time, and from time to time, extend the time specified in the notice by another notice in writing, under their common seal; but nothing in this section shall authorize the conservators, until the expiration of six months after the passing of this Act, to give to the owner or occupier of any mill or work a notice requiring him to discontinue the flow or passage, as aforesaid, of any liquid matter produced or used in the manufacture of paper, or in any process incidental thereto." That is the important clause with regard to the present sewage, and the one which I read before. With regard to future sewage, there was the scavenging of the surface besides, but that was not so important probably as the sewage. I do not know whether you have the means of giving the committee, or whether we must get from others, any information about the purity of the water of the Thames high up—whether it is not contaminated by sewage.

Witness: I have no means, beyond my observation in going there from time to time. It is very beautiful water. I believe that it will be a very pure water indeed. I understand that the commissioners before whom I gave evidence are considering the question of whether they shall extend this jurisdiction higher up than the three miles along the tributaries.

Mr. DENISON: Therefore it will be that much better, because the rival schemes, as we may call Mr. Bateman's and so on, we are not to go into; but you have read those pamphlets, of course; do you think any of them practicable schemes?

The CHAIRMAN intimated that it would be better to wait until those schemes were before the committee, before witnesses were examined upon them.

Mr. H. BAILLIE inquired whether the commissioners had power to extend their jurisdiction beyond the three miles.

Mr. DENISON replied that the commissioners had no power, without an Act of Parliament, to extend the operation of the Act of 1866, but that they had power to continue their inquiry.

Mr. DENISON (to witness): I think we have not yet got the amount of gathering area which the Thames gathers from. What is it?

Witness: Measured on the Ordnance map, I make it 2,500,000 acres. It is a very large gathering ground—2,500,000 acres above Kingston, and above Hampton 2,552,640 acres.

Mr. DENISON: Now a word about constant supply. That was a question which was considered a good deal in the committee of 1852, was it not?

Witness: Yes. The clauses with regard to constant supply in the Act of 1852 are very much the same as are found in a good many special Acts. There are two modes of constant supply—one without cisterns and the other with cisterns. I think you may say that generally speaking the modern practice is to apply cisterns for the water-closets. They have found great objection without. Constant supply without cisterns is by means of pipes connected direct with the mains, or the pipes belonging to the companies being constantly charged with water, drawing direct from the company's pipe through the communication-pipe to the house. After the pipe enters the house it is merely taken to a sink and a cock put at the end of it; in some cases there is a waste-pipe immediately under the cock from the sink, but in the majority of instances there is not. In fact there is such difficulty in preventing people from wasting water, that wherever we can possibly prevent it we do not allow a waste-pipe. In some cases the waste-pipe is allowed if the parties find it inconvenient without it. Take the case of Cambridge, which is a new work which I have constructed. Many parties there have so objected to have the water without a waste-pipe that the companies have adopted the bringing of a waste-pipe to a point where it can be seen, so as to ascertain whether they waste the water either in the street or in the yard or in the kitchen. The application of this to London is a difficult problem, and it will be an expensive problem. Taking the average of houses, the alteration of leaden pipes will be a very expensive thing. In some cases it may be done probably for £5, in others it would amount to £10, and in the better class of houses it will cost £15. The pipes are laid through the walls of houses, and they are plastered up in many instances, and the pipes are not half the weight they would require to be to sustain constant pressure, because it is not only constant supply but high pressure. We are bound under the Act to supply water to the tops of the houses, and there is no town which I am acquainted with where the compulsion of water supply is so great as in London. There may be instances in other towns, but it is almost universal in London; in point of fact, the late Mr. Thomas Cubitt consulted me on that point, and he said—"That is one of the things that I shall let the houses for. If you will devise me the best means of supply, I shall make a merit of it and let them." And no doubt he succeeded to a very great extent by showing the parties who wished to take houses that he had a convenient source of supply. He not only supplied water to every floor, but he supplied hot water as well as cold, and many more water-closets. Gentlemen with residences in Belgravia would not be satisfied with common supply. It is a different thing altogether. Then, again, the baths are much more convenient than they ever were before. There is one source of supply which requires to be very constant—and I do not believe that it can be done without cisterns—and that is, the hot water at the back of the grates. That is indispensable in a large house, and that is felt so material that the plumbers, unless they are looked after, habitually set the cock in the small cistern, supplying it to run to waste at the rate of about 10 gallons per hour—that is, 240 gallons per day. The application of the system to London I do not say is impossible, but I know it would be very expensive. I do not see my way clear to it, and it will lead to what would be thought very objectionable in London, and that is, the continual espionage upon the houses which would be necessary. For instance, now they do not like our man to go into the houses, and, rather than allow it in particular houses, I have been in the habit of going myself if I heard of any case requiring it, and asking permission—in fact, going to the gentleman or lady of the house; but it is not quite the thing to have common men going into houses; the householders of London are liable to many unpleasant things—robberies take place. The personation of parties is very easy in London. I know of many towns where there is a constant supply without the intervention of a cistern, but they are under considerable difficulty, and great waste of water occurs in consequence. Taking three or four towns for example, the principle of the houses is to have no waste-pipes at all. There is a communication-pipe, with a cock, and nothing under it to catch the water, if it flows to waste, except that cock itself was left open, which is very often done, that water has to flow into the drain. The pipe and cock is laid sometimes in the yard, but more frequently in the kitchen or scullery.

Mr. DENISON: I suppose in a scullery there must be a waste-pipe, because they wash the dishes, and have to pour the water away somewhere.

Witness: A waste-pipe we call a pipe receiving the waste water from a cistern: you speak of a sink-pipe.

The CHAIRMAN: Is there immediately under the cock that delivers the water into the house a pipe that will allow any waste of that water to run off—is that insisted upon or not?

Witness: In some cases it is, and in some it is not. In Bristol that is a point of contention between the inspectors and the inhabitants; they furnish the pipes away from the sinks, and they draw the water and take it to the sinks, but they find a few months after that they get the plumbers and connect it.

Mr. DENISON: The water companies have no means, have they, of preventing people from putting in, under one name or another, a drain or waste-pipe, or something which does protect their houses from being flooded?

Witness: No.

The CHAIRMAN: Do the companies in those cases make it a condition that there shall be no such apparatus, so that the house shall be flooded if the water is allowed to run to waste?

Witness: Yes; but they are not allowed to carry it out, because the floodings are very frequent. It is a very serious thing to have a house flooded; you have all the carpets spoilt, and furniture spoilt, and it is a thing I would not allow in my own house. Persons talk about constant pressure, but they do not know what the effect of it is.

Colonel HOGG: There is no difficulty, I hear, in other towns, such as Glasgow, Penrith, Liverpool, Manchester, Bradford, and Coventry. They have a constant supply in every one of those large towns, unless I am misinformed.

Witness: I believe you are quite correctly informed; but I happen to know that in some of those towns there is a difficulty, and one of the difficulties is the large quantity of water they use; for instance, Glasgow itself is an instance where the quantity of water used is enormous. It has been as much as 65 gallons per head per day, I dare say that the inhabitants of those towns would not think of going back to an intermittent system. It is unlimited in the case of Glasgow, I think, by the water itself; in fact, it necessarily must be so. We have the experience of the American towns. I endeavoured to get the report before this committee sat, but I have only been successful in the case of Boston. They have absolutely used the river there, and it was supposed to be four times the quantity that the town would ever want, and that has occurred in the face of a very serious inspection. In one year they fined upwards of 3000 persons for wasting the water.

Mr. DENISON: My learned friend has handed the paper to me. I see that they have been obliged to call in the aid of the police to prevent the evil of the wasteful use of water in the city; that is one of those passages.

Witness: Yes, those are extracts from reports of some years, and the reports from New York are even stronger than that; and it had this bad effect, that, in consequence of the waste of water in the lower part of the city, the higher part was unsupplied.

Mr. DENISON: I will read this passage from the report of 1864, about Boston:—"This was immediately carried out" (whatever it was), "and the result has proved that nearly half the water that has been brought into the city has been wasted. For the first ten days, which included about one-third of the city, there were reported 531 cases where water was running to waste, and 1353 cases where fixtures were out of order and water was leaking on that account." And there is a great deal more of that kind. "This shows a consumption of 97 gallons per head," (that is in Boston, in America) "an account believed to be without parallel in the civilized world." They might, perhaps, have added the uncivilized world too. It is nearly four times the quantity of water which is now got in London, is it not?

Witness: Yes, but we need not go to America for it. Take the case of Croydon, which is 12 miles from this room; that is an absolute failure as regards constant supply, and a very serious expense. They have no power to control it, and the inhabitants are in the habit of taking gutta-percha pipes, and I have seen the lawns three inches deep in water when the inhabitants in places a little above the common level could not get water at all. The water in that case is carried in without cisterns, and in some cases over sinks, and in some cases not, and they have rather a vigilant inspection there, but at this present moment the town is very badly supplied, and I had an application this morning from one of the railway stations to one of the London companies to extend their pipes. It is a simple delivery-pipe into a house, with a cock without a sink under it, in the majority of cases; but it is rather curious that they lately have been advocating cisterns there, as they found it very inconvenient in drawing off the water, which they had been obliged to do, and the houses had been left without water. They are now rather recommending and calling upon the inhabitants to put in cisterns, they having previously only had cisterns for water-closets. They get their water from wells sunk in the chalk. It is in connexion with the river Bourne, at

underground stream which flows to the surface about once in seven years. What I was intending to say about Bristol was merely in relation to the mode of supply to the houses. We find there that the inhabitants are in the habit of extending the pipes to the sinks, where they have been left away from them, and they are not particular at all in using the water. In the district of Clifton, the better part of Bristol, the quantity of water running at night, measured from a reservoir, was found to exceed the daily supply. Our resident engineer there paid particular attention to it, and he discovered that many of the inhabitants hooked up the water-closets and the water ran constantly, so that it increased the supply very much; and so much so that at certain seasons we have not had water enough for the supply there. We have now been taking water in from another district, and by more vigilant inspection and the prevention of waste, to the detriment of a large number of the inhabitants, we shall accomplish it, I dare say; but it is a difficult problem. Carlisle is another place where they have constant supply without cisterns, that is a particular instance. I constructed the works there, and we actually started those works and supplied water for all purposes to the extent only of 12 gallons per head, and it went on for some time; but the inhabitants got into the habit of using the water, it being more easy of access than it had been; and they had an impression in the town, which I believe was very true, that the water from the old red sandstone was very bad, whereas the water from the Eden was very fine, and the last time I measured it there it was 28 gallons per head, and the waste has got so much beyond the power of the works, that they are now bringing a duplicate engine to bear, and are going to lay another main. If anything was to take place like that in London, the Thames would be really insufficient for the supply. About one-half of the houses which have been spoken of have cisterns in the water-closets, but the extent to which they have water-closets in country towns is nothing like what it is in London; a large number have nothing but the common privies. Experience has proved that the only proper way of supplying water-closets is by means of cisterns.

Mr. DENISON: Can you account at all for their doing what you said they did sometimes—viz, tying up the ball-cocks?

Witness: They have a notion that they can wash out the drains, but they do very little by that means, because it is a mere little drain of water going along at the bottom of the sink, and it does not flush them out. It is quite a mistake; they think that it does. There have been such outcries of cholera in the district that the inhabitants seem desirous of doing anything. The local authorities have come to us and begged us to let the water be on, and turn it on on Sundays, or Saturday night, and anything we could possibly do to satisfy them we have done. One of the difficulties, or one of the things which makes stronger pipes necessary for constant supply, is the concussion which is caused by shutting every tap when there is a light pressure on. When you turn a tap suddenly you hear a sort of blow; that blow is regurgitation of the water. It is on the principle of the Montgolfier ram; but to some extent we have counteracted the effects of that blow in the constant supply by putting a small ferrule on, and the result of that has been to attenuate the water, and by the use of screw-taps there is a sufficient interval to destroy the regurgitation. We are obliged to reduce it to what, comparatively, we may call a dribble, and in many cases that would be inconvenient: for instance, in many cases, 50 per cent. of the water is used from six in the morning till twelve in the day. That is the only way which has been found yet of guarding against the flow upon the pipes and the risk of bursting; we know the pipes which we have been in the habit of using in London have been only half as strong as is necessary. When we have statements made that there is a constant supply in certain towns, we cannot assume from that, that it is a constant supply without cisterns; every case must be investigated by itself. There are two companies with which I am specially connected—viz., Chelsea and Lambeth. The incorporation of the Chelsea Water-Works Company was in 1843, and they have had further powers since.

The CHAIRMAN stated that it was not necessary to go further back than the year 1852.

Witness: Under the Act of 1852 the Chelsea Company established some engine-houses and filter-beds at a place called Seething Wells, above Kingston, and they had some reservoirs at Putney Heath. They are bound by the 20 million gallons arrangement like the rest; their rental is £300 a year. In 1866 they drew 8 million gallons; therefore they do not draw half of what they are entitled to draw. No demand for constant supply to my knowledge has ever been made upon them. In consequence of the Act of 1852 the Chelsea Company have spent upwards of £400,000.

The CHAIRMAN requested that accurate tabular statements of the expenditure of the five Thames companies since the year 1852 might be handed in to the committee.

Mr. DENISON: Do you afford a Sunday supply for Chelsea?

Witness: Yes, and on every day one besides; not on every other day as it used to be. No complaint whatever has been made to the Board of Trade under the Act of 1852 about the quantity or quality of our water, and, therefore, no penalty has been laid upon us. There has been no prosecution whatever under the Act of Parliament. Lambeth was the company which went a.. ve the point in 1848; they were the first to move. I had been some time urging them to do it. We went for an Act in 1848, but there was some little difficulty in obtaining money afterwards, but we got to work in 1852. The Lambeth Company came under the obligation, by the Act of 1852, to cover the reservoirs like all the rest, but they had no power to raise money for that purpose; they borrowed money—the chairman, in fact, lent the money to do it—and we carried it out at once. That has been legalized since. The Lambeth Company also give a Sunday supply to all the poorer part of the district; the other parts have cisterns big enough to carry them over Sunday; and with regard to that company there has been no complaint to the Board of Trade, no demand for constant supply, no prosecution, and, of course, no penalty.

Cross-examined by Mr WILLIAMS: In the answers I gave with reference to the supply my attention was directed exclusively to the Thames.

Mr. WILLIAMS: Have you ever considered the subject of the river Lea supply?

Witness: I know the river Lea, but I have not considered it with reference to the water-works. I have not considered the quantity and quality of the water sufficiently to give evidence on this occasion. I know the river Lea is a very fine stream and very good water, but I have not thought much upon it. It was not a district to which I was engineer, and unless I had been called upon I should not have thought of it. I only know the Lea as one of the public.

The COMMITTEE suggested that the witness had been called only with regard to the direct supply from the Thames.

Witness: If you ask me about the Lea, I know the Lea from the circumstance that I was umpire on the gauges under the Act, which led me to examine it every month for two years. You say the river Lea is no pure. Now I deny that, because I know the companies and I have seen the works, and they have done an immense deal to divert foul drainage, and a large sum of money has been spent there, so that the Lea, as far as East London is concerned, is far more pure than it used to be a few years ago. The only reference I can give as to the present state of the river Lea water is that I know a great deal of foul drainage has been diverted from the Lea and carried below the East London works.

Mr. WILKINSON: But do you know that, in spite of all that has been done, the water is now so impure that large eels have been found in the cisterns supplied by the company drawing its supply from the Lea?

Witness: This is the first time I ever knew of an eel in bad water. On the contrary, you always find them very good judges; and, in trying experiments, you will find eels will even come overland to visit you in the evening regularly. They are very fond of good water. The presence of eels in a cistern is certainly not an evidence of impure water. You may as well say that fish being in water is an evidence of the water being impure. The fact is, fish are as fond of pure water as we are. I do not think it a desirable system of supply which should allow eels to be found in several instances in the cisterns of the consumers, but the question is how to prevent it. Sometimes, even in our covered reservoirs with the finest grating, I have been puzzled how the small frogs have got in, but there has been an accidental hole through which they have got, and so it is with eels; and what is very curious is that they go in, at this season of the year, probably not larger than a pin, and next year you will find them, perhaps, an inch in diameter, and there is no doubt that they grew in the pipes.

Mr. WILKINSON: The system of constant supply would be free from the objection, at any rate, of retaining the eel until he had so enlarged himself, would it not?

Witness: How should it do so?

Mr WILKINSON: There would be no cistern.

Witness: But you do not suppose they come in the cistern?

Mr. WILKINSON: I believe the evidence is that they are bred in the cistern and enlarged considerably. Let me read you this. This is a letter at page 16, from a plumber to the editor of the *East End News*:—"Sir,—Seeing the paragraph in your last week's impression respecting the purity of the water supplied us through the East London Water-Works, that it is thoroughly filtered, I beg leave to contradict that statement, more particularly——"

Mr. DENISON objected to this being given as evidence.

Mr. WILKINSON submitted that the committee had already allowed these papers to be received as evidence.

The CHAIRMAN stated that the committee must take it as a sort of diluted evidence.

Mr. WILKINSON: "I beg to contradict that statement, more particularly at this crisis, when cholera and diarrhœa are making such fearful ravages through these districts, in order that some steps may be adopted to guarantee a pure supply. Now, the second week in June last, our water-pipe was stopped up, and, as I am a plumber, I cut the pipe, and, to my astonishment, found a dead eel nine inches in length, which must have come through the above works." Do you think that a desirable state of things?

Witness: It is not desirable, but it is a thing that is totally impossible to prevent once in two or three years.

Mr. WILKINSON: Only, unhappily, that is followed by another letter, and indeed by several others, with which I will not fatigue the committee.

Mr. DENISON objected that these matters ought to be proved in a regular way, and not by letters and newspapers.

Witness: It is very difficult to know how these things get in, and I have sometimes been puzzled. In the Green Park reservoir we know very well that we are filtering the water, and we take a great deal of pains in clearing it out very constantly, but still we find fish there; and I found that young men, going out to fish in the Colne, were in the habit of bringing them to London and letting them loose there. You might just as well have taken an objection to the Chelsea Company's water. The fact is, there are certain things which occur in water-works, and you cannot make them absolutely perfect at all times. I do not think that the facts which I have noticed prove that the existing supplies, whether from the Thames or from the Lea, are deficient in purity for the purpose. It is not the fact of an eel being in the water that proves that the water is impure. After all the East London Company had done, I can only say I believe the last time I was there, the water looked much purer than it used to look in former years, and I know they have diverted an immense quantity of drainage from the stream.

Mr. WILKINSON: But are you aware that, at present, the Lea is not dealt with in the same way as the Thames in respect to control by the conservancy and so forth?

Witness: I believe the commissioners have certain powers, but I do not know whether they exercise them or not.

The CHAIRMAN requested Mr. Wilkinson to confine his examination to points on which the witness came to give scientific evidence.

Witness: I have given my attention to the constant supply of water, and I think that in some cases it would be an improvement upon an intermittent supply, and in others it would not. I should say that the cases would be about equal; the fact is, if both systems were carried out properly they are both very good. There are some inconveniences attending a constant supply. Occasionally the water is turned off, or it is directed to a particular point, in case of fire or otherwise; then the inhabitants go short of water. Another inconvenience attending a constant supply is that when you want a larger quantity of water than the supply, you depend upon the extent to which it is allowed to dribble.

Mr. WILKINSON: But if the ferrule were used to a moderate extent there would be no difficulty in obtaining an ample supply at a moment's notice, would there?

Witness: I do not know about ample supply. Perhaps parties might want a little more than they got. No doubt there are also many inconveniences attending an intermittent supply.

Mr. WILKINSON: Are you aware that as many as twenty large towns have adopted the constant supply system?

Witness: I do not know the exact number, but I believe there are a great many.

Mr. WILKINSON: Are you aware whether the supply has always been constant—that is to say, whether there has been any change from the intermittent supply to the constant supply in those towns?

Mr. DENISON inquired whether constant supply with or without cisterns was referred to.

Mr. WILKINSON replied that his question referred to either the one or the other.

The CHAIRMAN suggested that it would be convenient if the question were put in one particular form.

Mr. WILKINSON: In the town of Ayr do you know that there has always been a supply on the constant system?

Witness: I have only been in Ayr twice in my life, and the last time I understood that they had got the water laid on, but I do not know anything about it. In Bristol the constant supply is without cisterns, with the exception of the water-closets, but there were old water-works which the company took to, and the inhabitants in many parts of Bristol have retained their cisterns. The great source of waste there is the abuse of the water-closets; they propped up the valve as an imperfect way of draining. There is now an improved system of water-closets, which prevents any abuse of that sort. It was the invention of our own resident engineer at Bristol, and the company are recommending the application of it in all cases. If that recommendation be complied with, it gets rid, to a great extent, of that source of waste, until the people can find out some way of dealing with it, and they will very soon do it. The water at Bristol comes from a series of springs taken up at Chewton Mendip, about four miles from Wells, going south of the city; it skirts the Mendip Hills, taking up other streams at Harptree, and terminating at Dundry, where there is a large reservoir. The supply is limited; it is a very bad country indeed for water. The cost of the apparatus which would prevent the waste of water in the water-closet, which has been mentioned, I think is about 16s. for each water-closet. I do not know that it is a thing that would satisfy everybody, because, practically, it limits the quantity to about a gallon, and many persons think that is not enough to flush a closet. You have to wait till it fills again. Then there is an intermediate chamber, which has to be filled to some extent. All those schemes will have to be tested by practice, and people will have their own liking about it.

Mr. WILKINSON: The constant supply system being open to the objection of flooding the waste-pipe, have you formed a comparison between that system of waste and the waste to which the intermittent system is subject by the imperfection of ball-cocks and the consequent flooding of cisterns?

Witness: I do not know that there would be much difference between the two. Probably the quantity of water wasted under the intermittent system of supply would always be greater than under the other.

Mr. WILKINSON: The third town to which I will call your attention is Carlisle. Was not that also always upon the constant supply system?

Witness: Yes, from the time of the construction of the works, about 17 or 18 years ago, and it is still adopted there. Carlisle is in a very unpleasant state about the water. The waste has gone on so long, and becomes so uncontrollable, that they do not know what to do with it. Last year the Board of Heath—the Town Council—purchased the works, and are now about making arrangements to endeavour to overcome the difficulty. I think they will, in all probability, adhere to the constant supply system, but it will be controlled to some extent; it cannot go on as it has done. If they had all the water in the Eden they could not satisfy it.

Mr. WILKINSON: Will you explain to the committee, in detail, what is done in Carlisle as to the house service?

Witness: The pipes are laid in and terminated, in most instances, over the sinks. But it is not only that; there are certain taps in the streets, the markets, and places where passers by, boys, and mischievous people turn on the water, and a great deal of waste comes from that. Altogether the system requires much greater attention and to be followed out with much greater strictness than it has ever been. The fact is, the company was established without an Act of Parliament, and they felt the difficulty in the end.

Mr. WILKINSON: Let me ask you one question with reference to the use of cisterns. Can you tell me whether or not, taking the average of towns supplied upon the constant supply system, the balance is not very much against the use of cisterns? Would it not be better, with reference to the supply, particularly of the houses of the poor, to avoid the cisterns?

Witness: No doubt of it; but then, in the application of it, you will, perhaps, allow me to state that there is considerable difficulty, and I state that from practical experience. In Westminster, some years ago, I felt great difficulty in supplying those poor neighbourhoods, and I recommended the company to spend a sum of money in laying down pipes and putting up stand-posts to serve the places independently of cisterns, and I believe a sum of £800 was spent; but in the course of a few months, although great pains were taken not to put any brass work or lead work (it was all done in iron), somehow or other the middle men or managers of the property became indifferent about it, and they would not pay the water-rent, many of them. Then there was nobody to take care of it, and many of the parties denied that the company had any power over it after they had once fixed it, and in the course of three years it was all spoilt and rendered useless. There were scarcely a dozen places left out of 44. It is one of the most difficult problems to supply those poor neighbourhoods where there is nobody to take care of the things; the children take the least bit of iron, or anything they can get, and endeavour to make money of it. There are hundreds of them idle in the streets with nothing to pursue but mischief. No doubt the fewer the fittings the less the chance of mischief of that character, but unfortunately the fittings in sight, where the water is drawn, is what they apply to. With reference to cost, the first cost under the constant supply system would be very much less than the first cost under the intermittent system. The expense is the difficulty which seems to strike the mind, and in the case of London the difficulty of introducing what may be said to be absolutely the constant system, in spite of the inhabitants. I mean on account of the espionage system which would be introduced.

Mr. WILKINSON: But I think you told my learned friend that the police prevent the wasteful use of water in America.

Witness: I think, if you will read those reports, you will find that it is not prevented. In the case of New York, there the council entreat the inhabitants to prevent waste. They are at their last drop of water, they have no means of supplying the inhabitants, and in spite of that even one of the newspaper editors there persisted in watering the streets, and would do it in spite of them, and said he had a right to do it, and, although he was brought up and fined, he then pursued the system of writing scurrilous articles against the council. You would find a great difficulty on the part of the magistrates in London to convict parties. One gentleman, who is now dead, used to say, "It is no use bringing them here; it is for the benefit of health that they should waste water. I will not convict." Besides, look what a state of things it would cause, to be continually summoning inhabitants.

Mr. WILKINSON: With regard to Carlisle, are you aware that up to the present time the authorities of Carlisle are greatly in favour of the constant supply system, on the grounds of its advantage to health, its readiness in case of fire, and the absence of cisterns?

Witness: I have heard some of them express quite contrary opinions.

Mr. WILKINSON: Can you tell us whether Croydon has always been under the constant supply system?

Witness: I know for the last two years they have been obliged to abandon it. It is, in point of fact, intermittent, and has been so for a long time.

Mr. WILKINSON: Is it not a fact that they have returned an answer in favour of constant supply on the ground of its coolness and its superiority for drinking?

Witness: It is shut off every night, and it has been frequently kept off for many hours. As engineer to the Lambeth Company, many persons have applied to me about the water, and I have said, "You are in the Croydon district, and you must go to them." And they say that they will come upon us and apply our Act of Parliament. The parish is named in our Act, and we are bound, under the Water-Works Clauses Act, to afford them a supply of water. At this present moment, in one of the suburbs of Croydon, quite close to our works, they cannot supply, and they do not supply more under the level of the streets, and they have sunk a tub, and the inhabitants go out there and take the water from it into the houses. It is a perfect farce about Croydon having a constant supply; it is not any such thing. I do not know anything about Darlington, or Huddersfield, or Lancaster, except the fact that Huddersfield and Lancaster have always had a constant supply. I do not know much about Leeds, but I know that it is a very badly supplied town. It is not an example which I should refer to, and certainly not a successful instance of a constant supply, because I have seen people carrying water in the streets continually. The Leeds people at the present moment are prosecuting a bill in this House to increase the quantity, and in which I suppose they are endeavouring to improve their constant supply. There is a constant supply at Paisley; but then Paisley is a poor sort of place. When you talk about supplying a town like London, compared with Paisley, your may just as well compare it with a few country villages with a few stand-pipes. Preston has always been on the constant supply system. I believe that Sunderland has a constant supply, but I do not know any particulars about it. I understand that they are improving the works still.

Mr. WILKINSON: I have given you the names of thirteen towns in which the supply has been always constant. Now let me direct your attention to some towns, which I think you will consider of great importance, where they have actually changed from the intermittent supply to the constant supply. First of all, are you aware that that has been the case at Birmingham?

Witness: I have understood so, and also at Derby. I have been consulted for some of those places—Birmingham, for instance—but I am not in a position to go into details. As regards Birmingham, Mr. Rolfe, their engineer, consulted me once, because he found such an enormous quantity of water wasted, and I told him that nothing but vigilant inspection would prevent it. The larger portion of the supply at Birmingham is pumped out from old coal-pits. I believe they would be anxious to get another supply; it is not a very well supplied town.

Mr. WILKINSON: Are you aware that Liverpool has changed its supply from the intermittent to the constant system?

Witness: Yes; and you cannot introduce a stronger instance. The probability is, that if London had done a similar thing, it would have been entirely without water. I happen to know a great deal about Liverpool. I was engineer to Liverpool, and constructed public works for them, and but for those works Liverpool would have been starved; they were obliged of necessity to take the 1,250,000 gallons per day, which I obtained for them, and to take it for the supply of the inhabitants, instead of leaving it for watering the streets, and drinking-fountains, and so forth. Really, strictly speaking, Liverpool has not had water to give either intermittent or constant supply; it is in reality what they call the Rivington Pike system, and it is a failure. Instead of supplying what they expected it would do—viz., some 15 million gallons—it only supplied 8 million gallons, and at the present moment they are going to enlarge and improve it; but Liverpool is one of the worst supplied towns in dry seasons in the kingdom.

Mr. WILKINSON: But still Liverpool has changed from an intermittent to a constant supply, and has no intention of changing back again to the intermittent supply, has it?

Witness: Necessity has made it intermittent. It is not a good system in Liverpool. It has been carried to a certain extent, and then and there left, and I cannot say that I think that Liverpool is any copy of a constant supply. There are very great complaints among the inhabitants of the quantity and quality of water. I have been in a friend's house there when we had no water for breakfast. The source of complaint is the occasional shutting off of the water. The fact is, they have not water enough to maintain a constant supply. I do not know to what extent cisterns are used, but not to a very large extent, because it is only during the last seven or eight years that they have resorted to a constant supply.

Mr. WILKINSON: As to Manchester, has that been a satisfactory change from the intermitent to the constant supply?

Witness: I was engineer to the old company there for ten years. I believe that in the outskirts of the town a good deal of difficulty has been experienced with it; and also in Salford, but I believe that they have remedied that. They have laid additional pipes, and it is going on better, but I believe that in some cases they complain. I understood that Nottingham always had a constant supply; it had for many years. Norwich was changed from an intermittent to a constant supply, but not under my advice at all. As regards Wolverhampton, I think you could hardly call that a change, because when I was there investigating the works for one of the contractors, I do not think that there were more than 211 houses at that time laid on. It was some years ago. What they have really done there has been the adoption of constant service, but the number of houses was very small. Halifax I have understood to be supplied on the constant system. Stockport is also on the constant system, but complaints, until the works were amalgamated, were made about supplying the higher parts of the town, though I believe that they are all rectified now. I was engineer to the Cambridge works; that town is supplied on the constant system. They had reason there to complain of great waste at first, but they have taken better precautions since experience has taught them, and the result of those precautions has been a very greatly reduced consumption of water. I believe the quantity is now reduced to little more than 20 gallons a head; it was formerly 31 or 32 gallons, but then that was from very great carelessness on the part of the manager. At one of the colleges they discovered an open pipe left running constantly into a drain, which I suppose must have taken away 20,000 gallons a day. Newcastle is also, I believe, on the constant system, though I do not think that it is a very perfect system, because I believe that there is a great waste of water there. I do not know anything about Lincoln or Durham. I think Ashton and Bolton always were on the constant system.

Mr. WILKINSON: Just let me ask you this: It results from that, that a very large proportion of those 26 towns (very considerable towns, as you see) had been originally constructed upon, or had been changed to the constant supply system; can you give me any instance where, after trying the ad-

vantages of the constant supply system, that system has been abandoned and the intermittent supply system taken up?

Witness: No; you know the constant service is comparatively a novel thing.

Mr. WILKINSON: The pollution of the storeage (which I have endeavoured to illustrate by the eels) would be prevented, would it not?

Witness: If I understand you, in that case the eel was in the pipe.

Mr. WILKINSON: He was between the pipe and the cistern, and he seemed to have grown fat, and become putrid. But, however, there is no doubt, is there, that the pollution of the storeage would be entirely prevented by the constant supply without cisterns?

Witness: If you had no storeage, of course there would be no storeage to pollute.

Mr. WILKINSON: And also the water would be used in a much more fresh, cool, and pure state than when it had undergone this detention in a cistern?

Witness: The gentlemen who instruct you have carried that a little too far. Now I have been somewhat in a position to ascertain about that cool state. I have often heard it asserted, and it is a natural idea, but like most natural ideas it is to be distrusted. It is a curious thing that, in hundreds of instances, I have tried the thermometer at our works and where the water is delivered, and there is not a degree of difference; sometimes it is less and sometimes more. If you have pipes laid down in streets which are well watered, no doubt evaporation does cool it to some extent; but practically speaking, it is really absurd to suppose that you get water cooler; you do not do it. No doubt it would depend upon where the cistern is in relation to the house, but, generally speaking, the water is of the same temperature.

Mr. WILKINSON: But still, the circumstance being similar, the water supplied almost direct into the glass of the consumer would naturally be more cool and pure and fresh, would it not, than water delivered into a cistern, and then drawn out of the cistern subsequently?

Witness: In many cases it might be, but in some it would not.

Mr. WILKINSON: You would also escape the annoyance in frosty weather of the freezing and outburst of the pipes, and that would be another advantage of constant supply, would it not?

Witness: That is a point as to which I am at issue with those who say so. I say that it will not be so, because in cases where the pipes have been laid on the main, and we have constant pressure, in many works we find that the water freezes just the same there as in the others. It is a fallacy to suppose that it would not; if it is in a still state the ball-cock is shut, and the pipe is full of water. Our mains are laid so deep that the frost never affects them.

Mr. WILKINSON: Then, with regard to the communication-pipes, would you not be able to lay them in a very much more protected state than would result from the consumers having the necessity to use a cistern, and possibly having to put that cistern at the top of the house?

Witness: It might be so certainly, but I think then that they would freeze almost as much as they do now. It is a mistake altogether. You would not want to carry the pipes in the roof, but they are not in the roofs now. You have it in some of the better class of houses, but in the poorer class of houses all the pipes lie on the ground floor.

Mr. WILKINSON: Would it be necessary to have that provision of taps where the cisterns are now used—for instance, at the top of a house—to supply a bath-room, or to supply a house generally, and to have that service laid on all over the house?

Witness: You would want the same pipes and the same tap. Of course, it would depend upon what the constant supply system is, and to what extent you carry it, but I do not believe that you would ever be able to do in London without cisterns. Assuming that you could do without cisterns, there would be a much less risk of exposure and of injury from frost, but I wish to state that the communication-pipe from the company's main into the house, and in the house itself, would be just as liable to freeze as it is now. If you suppose that you get rid of all the ill-effects of frost you are very much mistaken.

Mr. WILKINSON: I presume that, so far as the consumer is concerned, no more water would be fairly used under one system than under the other?

Witness: That depends upon circumstances. We will take the case of Folkestone. Folkestone, like Bristol, came to Parliament to get controlling clauses to give them two hours in the morning and two hours in the afternoon. You ask me about towns where they had gone back to the intermittent system. Folkestone is one of those cases, and in investigating that they found that the quantity of water used was so great when placed at the command of the people without control, that they had not water enough to do it; and in many instances they had very good evidence that parties had filled baths three and four times from the taps, and because they did not like the appearance of the water they had let it run to waste again; and they came to Perliament and got controlling clauses, and they gave them a supply for two hours in the morning and two hours in the afternoon.

The CHAIRMAN: But you had no cisterns?

Witness: No; but they had put them up since they came to get power to shut off the water from nine at night to six in the morning, and from nine at night to five in the morning in the summer.

Mr. WILKINSON: I suppose you have compared the consumption under the two systems; supposing that proper precautions are used, do you agree with the evidence, which I think has been given here, that the supply required would be actually less under the constant system than under the intermittent system?

Witness: It is my opinion that it need not be greater, but I do not know why it should be less, and my experience is that the constant and intermittent supplies would be about the same, assuming that proper control was used in both cases; but water supply is a thing where the greatest carelessness prevails, and it is very difficult to get two systems on the same parallel so that you can compare them. Of course the prevention of waste depends in a great measure upon the surveillance exercised by the companies themselves. Assuming that they can do so, it is a very difficult thing to interfere with people's privacy.

Mr. WILKINSON: Would not the officers of a company be necessarily more anxious to prevent waste where there was a constant supply than where the waste must necessarily be limited because the supply itself is limited?

Witness: Not necessarily so, because you must bear in mind that the supply in a town is going on in some part of it all day long, and consequently if their attention was directed to one part of the city, it would be to another.

Mr. WILKINSON: Surely the temptation to interfere with the waste would be much greater under the intermittent system than under the constant supply system, would it not?

Witness: I do not know that. Supposing that it was the same in both cases, there would be no inducement to interfere in one case more than another. I do not know that the loss to the company would be very much greater under the constant supply system than under the intermittent supply system. The intermittent system has its faults, no doubt, and its inconveniences, but the sanitary part of it must not be lost sight of. Introducing a large quantity of water within one or two hours of the day flushes the drains, and that must be very beneficial in dry weather. I can give no information as to the average consumption of Lancashire, and Yorkshire, and Manchester. I do not know anything about them.

Re-examined by Mr. BURKE: There is no doubt that if you have an unlimited supply of water it is a good thing that the public should have that unlimited supply. We have, of course, to regulate our supply according to our means; it may, therefore, be very possible in a small town with a moderate population to give a constant supply, and practically an impossibility when you have 3 million inhabitants to deal with, and that is the problem which we have to solve here. You must bear in mind that in the large towns, where there is great wealth, luxury is not only studied, but is carried to the greatest extent. The legislation of 1852, upon which all the London companies have conducted their subsequent operations, was based upon the intermittent system, and cisterns were especially provided for in the Act. If we were to change in London to the constant system there must be compulsory legislation for the alteration of fittings, that compulsory legislation not affecting the companies alone, but the whole of the public. So far as my information goes, the general average of the cost of altering the fittings throughout the whole of London may be estimated at about £5 in the lower class of houses; in the middle class at about £10; and in the large class at £15. Taking that over the whole of London, it would be about £2,500,000 to £3,000,000; that would fall upon the present landlords of the houses. There would be a good deal of expense outside, because we are different in some respects to the country towns. For any opening in the streets we have to pay 1s. 6d. per yard, and in some cases 1s. 9d. It is becoming a very expensive operation in London to deal with the streets, and all that must be dealt with. If we were enabled to limit the supply to the same amount as by the intermittent system, the public would gain no advantage under the constant supply system, and, if they got a very much increased quantity, I believe that the present source would soon become deficient. If there were a large amount running to waste, that which we now look to as a supply for many years to come would not last for so many years, and, so far as my knowledge goes, it would be a very long time before you would be able to control the Londoners: they have been accustomed to use as much water as they like, and it is very extensively applied in certain seasons; in dry weather the quantity of water used in London is wonderful; in the dry summer of 1864, and again in 1865, in each of the works they suddenly jumped up a million gallons one day in a week. Under the constant supply system, if we had to regulate that, we should have to exercise a much closer inspection and control than we do now. I do not think that that would be viewed favourably by the occupants of houses generally. Londoners have a very great objection to persons interfering or demanding entrance into their houses, and you would find in many cases that it would be completely impracticable.

Mr. WILKINSON: Under the present system, then, they have an adequate supply at present, only subject to what is represented on the other side—viz., the injury from storing in cisterns?

Witness: That is exaggerated very much. Parties who are in the habit of keeping their cisterns in a proper state do not find it; practically, the water supplied through the cistern is generally as good in quality as when it comes into the cistern, and when they are covered there is nothing to contaminate the water. With regard to the eels, if we take Loch Katrine as a large cistern which supplies Glasgow, that is pretty full of fish; eels may come down the pipes there in large quantities. Glasgow is alluded to, and stated as a success, and so on; but it must be taken with all its circumstances. At the present moment they are duplicating the pipes; that proves to me that they are using more water. Then it did not rest there; they have actually gone back to the river Clyde for the supply of the large public works. And, as regards Liverpool, the large works which they have executed there, called the Rivington Pike Works, are already becoming insufficient; and they are now contemplating going to Bala Lake, at an enormous expense, to supplement that supply. The constant supply at Croydon has been found an impracticability as regards raising any sufficient quantity of water; and there is this difficulty at Croydon, that they supply the low parts of the town, and the people use so much water there, and deal with it so unwarrantably, that they deprive the upper parts altogether of water. The supply depends altogether upon the quantity at the command of the person supplying. Croydon is what is called under a local board of health.

Mr. WILKINSON: Here I find a placard, dated June 30, 1866:—"Water Supply.—Until further notice, water will be supplied from the water-mains of the Croydon Board of Health, between the hours of 7 a.m. and 10 a.m., between 12 a.m. and 6 p.m., and between 8.30 p.m. and 10.30 p.m.;" and it is signed by "Baldwin Latham, engineer." Have you seen that?

Witness: I saw this placard in Croydon—in Croydon obviously—under the notice given by the Local Board of Health. It is an intermittent supply.

Mr. WILKINSON: Now I find another one subsequent to that, dated the 25th of August, 1866:—"Croydon Local Board of Health Water Supply.—The inhabitants of Croydon are respectfully informed that, in consequence of the great demand for water and the unfinished state of the new water-works, it is necessary, in order to furnish a supply of water to all parts of the district, to curtail the number of hours during which it will be supplied to the town. Notice is, therefore, hereby given that, until further notice, water will be supplied between the hours of 7 a.m. and 9.45 a.m., between 12 a.m. and 5.30 p.m., and between 9 p.m. and 10.30 p.m. The consumers of water in the district are urgently requested to co-operate with the local board in preventing any waste of water on their premises, as, in consequence of the great waste that is now taking place in many parts of the town through defective taps, closets, and carelessness, much inconvenience is occasioned to many persons, and a very heavy as well as unnecessary expense incurred in having to pump a large amount of water that runs to waste." That is rather an illustration of what you have stated about the constant supply, is it not?

Witness: The fact is they burnt their church down there, although they had a constant supply of water; they were all there, and the water was there, but they did not know how to apply it, and the church, which was a very valuable one, and I think must have cost £20,000, was entirely burnt. I consider that that happened because there was an inconstant supply at that particular moment. In the outskirts of Croydon, Addiscombe, and Selhurst, and several of the other outskirts, they have not any water at all.

Mr. BURKE: My learned friend asked you whether, under the constant

supply system, you would not avoid the danger and inconvenience arising from the bursting of pipes. I read here a statement relating to Croydon again:—"Mr. Latham: A deal has been said respecting the necessity of cutting off the water supply during the night; but if I could see my way clear to keep the water turned on during the night I should be happy to do it. I believe it is desirable, but under existing circumstances it is impossible to carry out such an arrangement, otherwise we could not supply districts which we are now supplying. [A Voice: It is on neither night nor day; we have had no water to-day.] It is quite true, and I regret the circumstance, but I am unable to assist you. The sudden breaking up of the weather has caused a large number of the pipes to burst, resulting in an immense waste of water, which has disconcerted the whole of our arrangements." So that it appears that, according to that, under the constant supply, pipes burst, as well as under the intermittent supply.

Witness: I happen to know a good deal of Croydon, and there were a great number of burst pipes at that time. The inhabitants were so badly off for water that, when we put our stand-pipes up, we employed additional men, and I said, "Now carry water wherever the inhabitants want it." We made no distinction whether they were our tenants paying us water-rent or not. We took it generally, and we actually supplied them just after the frost to a great extent, and got very great credit for it. If that was to be a test of the effect of frost on the constant supply, it certainly was a lamentable one, for the number of bursts was immense. Under the constant supply, if a pipe bursts you must cut off the whole supply to mend the pipe, unless you put stop-cocks on, which they object to under that system, because they say it affords an opportunity of persons tampering with the pipes. As I stated, our company, with regard to the supply to the poor, did their best by giving stand-pipes to give an adequate supply. We do it on all occasions; in fact, there are general orders for the turncocks to afford a supply. We do not wait for reports and orders for that, but the men are to do it there and then, of course on good reason, and to report.

Mr. BURKE: You did do it as it appears; but, as you stated, you were obliged to disuse it after a certain time, not from fault of your own, but, because on account of dilapidations and other things, you could not carry it on?

Witness: Yes, there is very great difficulty; and, in that case, I ought to add that the middle men, or the managers of the property, cut away the cistern and pipes right and left, and sold the whole of them, and I am not quite sure that they did not pocket the money. At any rate, no fault is imputable to the company; it is one of our great difficulties to maintain the supply to those poor neighbourhoods. They let the things get out of order, and they go to others, and there they fight for the water. That was the case where £800 was expended. Whether the supply be constant or intermittent, we have an adequate amount of water for the supply of those poor districts, and we would be quite prepared to furnish that supply, being adequately paid for it. The adequate payment must be a compulsion upon those who take the supply, and the compulsion must be upon them to maintain the fittings; but there is very great difficulty in doing it, and in applying legislative enactment to it, and for this reason—the local board have representations made to them; one or two members of the local board discover that it will affect them and their friends, then they call upon the companies to know what they would supply it for, and, in many instances, we find that the action there ceases, they do not compel the parties to take the water. In one district just now I know that there are about 47 cottages unsupplied with water. It is a notorious fact, the parties profess to have a great deal of consideration for the poor, and we actually find that the houses belong to them, and they do not spend a penny. It is in the Chelsea district. Any deficiency in the supply of water to the poor, points rather to the necessity of legislation as affecting landlords than to legislation affecting the company; the company do what is required of them; there is immense difficulty in dealing with the managers and owners of that class of property. In two cases, Folkestone and another, they were obliged to substitute cisterns, after introducing, first of all, constant supply; they came to Parliament, and got permission to alter the hours of supply, and in fact to make it intermittent. Supposing the object which is supposed to be in view here be obtained—viz., to do away with cisterns in London—and were not to answer, the whole expense of £3,000,000 would have to be gone to again in reinstating the cisterns.

The CHAIRMAN: Are you acquainted with the valley of the Thames?

Witness: Yes, I have known it for many years, and have been professionally engaged upon it for many years, and am to some extent acquainted with the geology of the valley of the Thames. It is very nearly the largest gathering area of water in England, I believe. It contains, as I mentioned, above Kingston, 2½ million acres, and you are aware that it is a very flat valley, extending to the chalk hills on the one side, and to the colitic hills of the Cotswold on the other side. It is not the best suited, as compared with other valleys, for the construction of reservoirs. It may be termed a limestone district. There are very few minerals in the valleys which would be likely to injure the character of the water. I register every morning the height of the Thames, and I have approximated to the quantity flowing into it; I know that it gets up to a very large volume. The quantity coming down the river in what are called floods is enormous; I have known it to rise 11 feet 10 inches above the summer level. I should think that would be at least fifty times greater in quantity than the water in the dry season which I mentioned as 500 million gallons. At present we take out in one day 50 millions gallons; that is all the five companies—about 10 million gallons a piece; so that enough water would flow down one day in a flood to supply the metropolis for a year. We have had very heavy floods on the Thames this last year. Down to a comparatively recent period in this year the Thames has been in flood, but they have not been heavy floods. The rain has fallen so as to produce a height of 2 feet 6 inches and 3 feet above the summer level; that we do not think an extraordinary flood. About double the flow in the dry season, taking 5 million gallons as the standard in the dry season, is a very common flood; we very often have it five or six times as great as the ordinary flow. Therefore, as regards the volume of water coming down the Thames, there is in my opinion a sufficient quantity of water to be stored, if it were required to store it, in the valley of the Thames, but I do not think it would be at all necessary for many years; if it were necessary it would not be a question of the quantity of the water, but a question of the works for storing the water. There are certain places up in the higher reaches where they could get very good sites for reservoirs above Oxford, and there is one place below Oxford. I should think that a storeage could be made of 70 or 80 days water; that would be 100 million gallons.

Colonel HOGG: Do you mean at Pangbourne and the locality?

Witness: We should go above Pangbourne. A very nice stream comes in at Pangbourne.

The CHAIRMAN stated that it would be convenient that the Metropolitan Board of Works should furnish the water companies with a statement of the points which they proposed to raise in their opposition.

Mr. CRIPPS said that such a statement should be furnished to-morrow morning, but that he feared it would not be practicable to furnish it that evening.

Some discussion arose as to the course of procedure, and the committee then adjourned.

(To be continued.)

HOUSE OF COMMONS.

METROPOLIS GAS ACT AMENDMENT BILL, 1867.

SECOND DAY—FRIDAY, MAY 24.

Mr. VENABLES applied to the committee, on behalf of the Crystal Palace Gas Company in particular (on whose behalf an appearance had been entered in consequence of a notice received), and the suburban companies in general, to state for their guidance that the suburban companies would not be included in the bill.

Mr. DAVISON stated, on behalf of his own clients, that he had no objection to his learned friend's clients being discharged from attendance if they thought right to retire.

Mr. GROVE, on behalf of the Metropolitan Board of Works, stated that he had no instructions at all on the subject, and in answer to a question from the right honourable chairman, he further stated that his clients had no present intention to introduce any clauses that would affect the suburban companies.

Mr. GATES inquired if that applied to his clients, the Wandsworth and Putney Gas Company.

The CHAIRMAN stated that that company was in the schedule of the original Act.

After a few observations from Mr. DAVISON, referring to his speech of Tuesday last, the following witnesses were called for the promoters of the bill:—

Richard Henry Wyatt, Esq., examined by Mr. DAVISON.

I am the parliamentary agent for the Board of Trade, and am conducting this bill. The whole of the negotiations between the Metropolitan Board of Works, the corporation of London, the gas companies, and the Board of Trade are now printed, including the document dictated by Mr. Baxter, and written by me, as to the terms upon which the second reading of the bill should be allowed. I have the original document here, signed by Mr. Paull and Sir Stafford Northcote. I was agent for the Metropolis Gas Bill of 1860, which bill was promoted by the consumers. I have here a book published at the office of the JOURNAL OF GAS LIGHTING, 11, Bolt Court, which appears to be a reprint of the published proceedings in Parliament in connexion with that bill.

Mr. DENISON objected to this as evidence.

Mr. DAVISON: I withdraw the book. (To witness:) Were you present when Mr. Sotheron Estcourt made some observations?

Witness: Yes.

Mr. DAVISON: Can you say whether that which is printed in this book tolerably accurately represents what it was?

Witness: I believe it to be correct.

Mr. DENISON: See what we have come to—does the printed book tolerably represent what took place seven years ago?

Mr. DAVISON: We can get it in another way. We can get the report of what took place every day in the committee. Will the committee allow us to supply them with the minutes of what took place at some future time? I think we can get a copy.

The CHAIRMAN: Whenever the time comes for any evidence to be produced, if it is not objected to we shall receive it, and if is objected to we shall consider the subject.

Mr. O'MALLEY stated that the counsel for the City and the counsel for the Board of Works had agreed, as far as possible, to conduct their case as one case. The learned counsel stated that he did not propose to trouble the committee with an opening speech, but would reserve the right of summing up, as usual, at the end.

Mr. DENISON said he merely wished to know which of the public bodies concerned was to be taken as the actual promoter.

Mr. O'MALLEY said he would not interfere with Mr. Denison in any way, and the case would be conducted throughout as one case.

Mr. DENISON suggested that the preamble of the bill being only an introduction to the bill, it would be better to postpone that until the clauses had been discussed.

The CHAIRMAN stated that that seemed a very desirable course to pursue.

Mr. RODWELL said that he would endeavour to limit his examination of the next witness as much as possible, but it might be necessary to extend it to more than one clause. He further stated that he would first direct the attention of the witness to the question of purity and price.

Samuel Hughes, Esq., examined by Mr. RODWELL.

I am a civil engineer, and have offices in Park Street, Westminster. I have turned my attention to the question of the supply of gas for the last 15 or 20 years, and have been engaged in all the metropolis gas inquiries since the year 1858. In addition to that, I have had considerable experience with regard to country gas-works all over the kingdom, both on behalf of gas companies and also of their opponents; more especially in behalf of local authorities, corporations, and public bodies. I was examined before the parliamentary committee in 1860, and also during the inquiry in 1866.

Mr. RODWELL: Without going into the details of the evidence that you gave then, has anything happened or has any circumstance occurred since then to alter your views at all?

Witness: I think not. The circumstances may not be quite the same in every respect as they were in 1860, but they are the same as they were in 1866, as far as I am aware.

Examination continued: I have read over the evidence which I gave in the years 1860 and 1866 with a view to this inquiry, which evidence is all referred to this committee. I have seen the bill as now presented to the committee in its amended form—*i.e.*, with the blanks filled up—3s. 6d. per 1000 cubic feet as the maximum price of gas, and 18 sperm candles as its illuminating power. For the purpose of informing myself with regard to the cost at which gas can be supplied of a certain illuminating power, I have made inquiries as to the actual price of gas in the principal cities and towns of the kingdom. At Birmingham, the illuminating power by the Act of 1864 is 14 candles, and the price ranges from 2s. 3d. to 2s. 6d. per 1000 cubic feet. It may go, perhaps, to 3s. in certain cases, but I know that the lowest price is 2s. 3d. At Blackburn the price is 3s. 9d. to 4s. for 20-candle gas; at Bradford, 3s. 4d. for 14-candle gas; at Brighton, 3s. 6d. for 14-candle gas; at Derby, 2s. 11d. to 3s. 5d. for 12-candle gas; at Edinburgh, 3s. 9d. to 4s. 7d. for 30-candle gas; at Glasgow, 3s. 7d. to 4s. 2d.

for 30-candle gas; at Ipswich, 3s. 9d. for 12-candle gas; at Leicester, 3s. 2d to 3s. 11½d. for 12-candle gas; at Liverpool, 3s. 2d. for 21-candle gas; at Manchester, 3s. 2d. for 21-candle gas; at Nottingham, 2s. 8d. to 3s. for 17-candle gas; at Plymouth, 2s. 9d. for 12-candle gas; at Preston, 3s. 4d. to 3s. 9d. for 19-candle gas; at Rochdale, 3s. 3d to 4s. for 20-candle gas; at Salford, 3s. 4d. for 20-candle gas; at Sheffield, 3s. 6d. for 14-candle gas; at Stockport, 3s. to 4s. for 20-candle gas; and at Walsall, 2s. 2d. to 2s. 8d. for 12 or 14 candle-gas, I am not quite sure which.

Mr. RODWELL: The cases of Edinburgh and Glasgow seem to be exceptional; the illuminating power is far in excess of other towns, and there is a larger charge made. What is the cause of that exception in those two cities?

Witness: The raw material used is of a very peculiar quality; it is a rich cannel coal, which the Scotch call "parrot coal." It makes very superior gas, and costs something more than common coal. There are other towns in Scotland where the illuminating power of the gas is probably quite as high, more especially in Aberdeen, Dundee, and Greenock. At Inverness also it is very high, but I have selected places where there is a large population, and where the prices have been absolutely calculated and are known. I have myself also gone minutely into the cost of producing gas of different illuminating power. In my examination last year I was asked with regard to the price at which gas of 12 or 14 candles illuminating power could be sold to pay a dividend of 10 per cent. on the capital of the company. I said—"I should divide the cost of gas to the public into three parts, one applying to the raw material, the second applying to the cost of manufacture, and the third to the interest on capital. If we add interest on capital at 10 per cent. —on a moderate capital—I think 12-candle gas could be supplied for about 2s. 10d.—*i.e.*, made at the most economical rate, and with an economical capital." I still adhere to the accuracy of that view.

Mr. RODWELL: Now, under the same circumstances, at what cost could gas be supplied of 18 candles illuminating power?

Witness: Comparing with that estimate, I should say that the difference between 2s 10d. and 3s. 6d. would be just about the difference of cost as between 12 or 14-candle gas and 18-candle gas. I propose for making 18-candle gas a mixture or Fifeshire cannel and Newcastle coal, in the proportion of 3 tons of the former to 10 tons of the latter: 3 tons of that cannel coal would produce 37,500 cubic feet of gas, of an illuminating power of 35 candles—*i.e.*, 12,500 feet per ton. The Newcastle coal will produce 9500 feet per ton of 12-candle gas, making from the 7 tons 66,500 feet. The total yield from the whole 10 tons of coal would be the sum of those—viz., 104,000 feet. The yield per ton would be one-tenth of that—viz., 10,400 feet of 19-candle gas. The way in which I find that the quality of the gas is 19-candle gas is this:—3 tons of 35-candle gas are equal to 105 volumes of 1-candle gas, 7 tons of 12-candle gas are equal to 84 volumes of 1-candle gas; the whole of the 10 tons are equal to 189 volumes, which gives me the whole 10 volumes of 19-candle gas; therefore I have a margin of one candle. Then, with regard to the cost of making 10 tons into gas, in this case I deal first with the raw material. Three tons of cannel coal, at 35s., being £5 5s., and 7 tons of Newcastle coal, at 15s., being also £5 5s., make a total of £10 10s. for the cost of the coal. Then I deduct the residual products from the 3 tons of cannel coal, for which I shall get 5s. per ton—viz., 15s.—and from 7 tons of Newcastle coal, at 8s. per ton, which is equal to £2 16s., which makes the total yield of the residual products £3 11s. That sum, taken from the cost of the raw material—viz., £10 10s. —leaves £6 19s. for the net cost of the coal and cannel, after deducting the products left in the retorts. Then, when divided by 10, it comes to 13s. 9d. per ton for the coal. The produce of one ton is 10,400 feet; from that I take one-eighth for leakage and loss, making 1300 feet, leaving a net quantity for sale of 9100 feet per ton of coals. I have, therefore, to divide the 13s. 9d, which is the price per ton of coal, by 9·1 to get at the cost of gas by 1000 cubic feet, and that gives 1·53s., which is equal to 18·33d. The next item is the cost of manufacture, which includes all the working expenses of making the gas, exclusive of the raw material. It includes wages, salaries, and repairs in all parts of the works, removal and restoration of the plant—in short, every item in the accounts of the companies exclusive of the raw material and interest on capital. I find that the establishment charges of the companies vary very considerably in different parts of the kingdom. I account for that by the various modes of management, the insertion in the current expenditure of charges which should go to capital—which, are, in fact, for extensions of the works and matters of that sort; irregularity in keeping the accounts, and so on. There are certain expenses which should be lower as works enlarge; others are more constant. No doubt a concentrated area is cheaper to supply than a more extended one. There is a saving in leakage and the cost of repairs. I allow for manufacturing expenses 1s. per 1000 cubic feet of gas sold. In estimating the interest to be paid to the companies, I take the capital invested at £4 per ton of coal distilled or carbonized. I have arrived at that £4 from an examination of a great many accounts in various towns. In some I found a less rate of capital. One London company has a capital just over £4 per ton; others very greatly exceed that.

The CHAIRMAN: What do you mean by £4 per ton?

Witness: Per ton of coal used in a year in their retorts.

Mr. RODWELL: From which the gas is made?

Witness: Yes; from which the gas is made. I apply it only to that coal, because some companies use the small coal under the retorts, and I do not include that. Many companies use their coke.

Mr. RODWELL: If they use their coke they lose the value of that residual product?

Witness: Yes, of course.

Mr. RODWELL: What do you put the interest on capital at?

Witness: The interest on capital I put at 9 per cent.; that 9 per cent. applied to the whole capital is in reality 10 per cent. on the share capital. From an analysis of all the London companies accounts I find that, practically, where they are said to pay 10 per cent., that being the full parliamentary authorized dividend on all their capital, it amounts to just under 9 per cent. On some capital which is borrowed they only pay 5 per cent., and on other capital which Parliament allows them to raise after the works are constructed, they are limited to 7½ per cent.; so that the whole of the capital does not bear a rate of interest beyond 10 per cent. The original share capital usually bears interest at 10 per cent., according to the special Act or the legislation of 1860. Applying that interest to the capital I find it amounts to 8d. per ton of coal, or 9·60d. per 1000 cubic feet of gas. The cost in shillings is 3·33s., or 3s. 4d., and in pence 39·93d. Therefore I say that 18-candle gas can be produced and sold in London for 3s. 4d. per 1000 cubic feet.

Mr. RODWELL: That being your calculation, is there any reason, in your opinion, why gas should not be supplied by the London companies at the rate you have mentioned here?

Witness: I think the public are entitled to have it at a rate not exceeding that.

Cross-examined by Mr. DENISON: You do not propose to alter the dividend, I see; you think they can pay that?

Witness: I do not propose to alter the dividend sanctioned by Parliament applied to a proper capital.

Mr. DENISON: "Applied to a proper capital?" That is raising a new point. Do you mean that Parliament should revise the capitals of the companies?

Witness: Most decidedly; I have always said so since 1860.

Mr. DENISON: You do not propose to leave that 10 per cent. on the moneys which the companies have actually found in the shape of shares?

Witness: Not in the exaggerated form in which the accounts stand at this moment.

Mr. DENISON: Do you propose to let the people who have found the money for making these gas-works in the shape of shares go on receiving 10 per cent. on it?

Witness: I should say no, certainly. If you put it in that general way, I propose that the present capital shall not be entitled to 10 per cent. dividend.

Mr. DENISON: Now, then, we will go to something else. My learned friend talked about your experience; have you ever managed any gas-works, or constructed any gas-works?

Witness: I have not managed any, nor constructed any throughout, but I am about to construct works.

Mr. DENISON: In the year 1860 you gave very much the same evidence about the duty of the companies to reduce their price, did you not?

Witness: I think I did.

Mr. DENISON: And you have told us that you have not altered your views since 1860. Have you read your evidence?

Witness: That is with regard to the year 1866. I have not seen the evidence of 1860 lately.

Mr. DENISON: Did you not, in the year 1860, before Mr. Sotheron Estcourt's committee, give very much the same calculation that you have given now; and did you not tell them that the companies ought to be made to reduce their price?

Witness: I cannot answer that sort of general question.

Mr. RODWELL: If my learned friend has the evidence he can easily refer to it.

Mr. DENISON: Do you remember that?

Witness: I really do not think there was much said about reducing the price.

Mr. DENISON: Well, then, we can make our speeches on the evidence.

Mr. RODWELL: I think that is hardly fair. If the question is put in that general way you should direct his attention to the particular answer and question.

Mr. DENISON: That I could do without the evidence being referred to the committee. The object of that is, that you may select from it. Each side has the same opportunity, and if I do anything unfairly your party has the last word, and so much the worse for me.

The CHAIRMAN: If you put it to me to decide, it does not appear that there is anything unfair in asking the witness whether he gave generally this evidence in 1860. You will re-examine him, and you can direct his attention to anything necessary to put him right, if you feel that he has been shaken. I do not think that there is anything unfair at present.

Mr. DENISON: You can tell me another thing, perhaps, from recollection —was coal dearer or cheaper in London in 1860 than it is now?

Witness: My impression is, that on the whole it was nearly the same in 1860 that it is now; but in some years the price fell considerably.

Mr. DENISON: Do you mean to say that the price then was the same as it is now?

Witness: I have here a table which gives the prices, and I think they are nearly the same. There are good materials for obtaining the price of coal, because there have been returns printed by Parliament, at the instance of Mr. Moor and Captain Gridley, showing the prices for some years past, and I have made out a table from these returns.

Mr. DENISON: Can you tell the present price of coal in London? Do you know anything about the tenders at this moment?

Witness: I do not see the tenders, of course. I will answer that my abstract is correct. The City Gas Company paid per ton for coal in 1861, 16s. 11¾d.; in 1862, 14s. 11d.; in 1863, 14s. 11d.; in 1864, 15s. 5d.; and in 1865, 15s. 4d. That is a reduction since 1860.

Mr. DENISON: Go on.

Witness: I have no further return; therefore I cannot answer. I have no further knowledge on the subject.

Mr. DENISON: Do you really mean to say that you have no knowledge of the price of gas coal in London at this moment?

Witness: No, I should not like to answer that question; but running down the figures generally, I find a diminution rather than otherwise. The Ratcliff Gas Company paid 17s. per ton in the year 1861, and in the year 1865 they paid 15s. 8d. The South Metropolitan about the same period paid 15s. 3d., 15s. 6d., 15s. 2d., 15s. 4d.; practically there is no difference in any of these years. With the Chartered Gas Company as well as I can calculate their coal, considering they do not give the separate quantities of cannel and other coals, the price was 19s. 9d. per ton in the year 1861 and it fell to 17s. 7d. in the year 1865. I cannot see that there has been any increase but on the contrary.

Cross-examination continued: My knowledge only carries me to the period at which I have the means of accurately giving the price. I do not know what the price is at present. The object of Captain Gridley's return was to give the information respecting every company established under Act of Parliament. I know there are many places where the price of gas is a great deal more than the figures I have given. A great many places are authorized to charge more for the simple reason that their bills have not been opposed in Parliament, and the companies have put in almost any figure they pleased. The dividends of those companies vary very much; a good many divide 10 per cent. I do not know that those who are charging more divide more than 10 per cent. It often happens that the higher the price the less dividend they make. There are few that have Acts of Parliament passed since the Gas-Works Clauses Act that pay more than 10 per cent. I have not ascertained from Captain Gridley's return the number of companies that are charging as much or more than the metropolitan companies. I know that the price charged by the Brighton Gas Company is now 3s. 6d. what it was in former years I do not know. By their Act of last year they are limited to 3s. 6d. for 14-candle gas. I do not know that in consequence their dividend has been reduced, and I should hardly take one year as a fair criterion, because the greater number of customers who may be expected to come on at the reduced price, would not come on at first. The 13s. 9d. which I have given as the cost of the raw material in London is the cost of a ton of coal consisting of three-tenths Fifeshire cannel and seven-tenths Newcastle coal, deducting the value of the residual products. I know very well what is actually obtained by the companies for their residual products from the

returns presented to Parliament every year. I estimate that they get back from Newcastle coal 8s. per ton—they would have 2s. 3d. for a chaldron of coke to sell per ton of coal, a certain amount of tar and ammoniacal liquor, and a little breeze. These would be the chief products. Breeze is the small ashes which they sell to brickmakers. Fifeshire cannel does not yield anything like such valuable products as Newcastle coal; I allow only 5s. per ton. I get at that 5s. from a comparison of the accounts of the companies which use cannel coal. I believe at the present moment that is the price which the Western Gas Company received for their products. I cannot precisely tell how that amount is divided. There is a great deal more tar from cannel and less coke. The coke is not worth more than from 3s. 4d. to 5s. per chaldron, whereas the coke from Newcastle coal is worth 9s. or 10s. The tar per ton of cannel is worth, I should say, from 1s. to 1s. 3d.—perhaps more.

Mr. DENISON: You know probably that Dr. Letheby who was examined last year for your people said that 14-candle gas was as high as it was expedient to go?

Witness: He was not examined for the corporation on that point, I think

Mr. DENISON: Who was he called by?

Witness: By the corporation probably, but his opinion was never asked, so far as I know, about the 14-candle gas.

Mr. DENISON: You do not mean to say he was not asked that question.

Witness: I am not certain by which side he was asked the question.

Mr. DENISON: You said you did not agree with him.

Witness: I did most decidedly. To say that 14-candle gas is the highest illuminating power London is entitled to, in the face of the fact that a great many towns in Scotland have 30-candle gas, and that all over Lancashire it is above 20 candles, is extraordinary.

Mr. DENISON: Do you not know that Dr. Letheby said that, having regard to all the circumstances of the case, 14-candle gas was as high a figure as it was desirable to put in the bill.

Witness: No, I did not understand him to say that. I understood him to say that 14-candle gas was sufficiently good for London. I certainly differ from that opinion entirely.

Mr DENISON: Here is Dr. Letheby's evidence:—"The *Chairman:* I think, perhaps, you had better state to what extent you require improvements on each head?—*A.* I have been obliged to come to the conclusion, after a large experience, that London is better without cannel gas: 14-candle gas, I think, is good enough for London. *Q.* You do not recommend cannel gas?—*A.* No, I do not; not only because cannel is so scarce, and has become so much dearer, but because cannel is not, in my judgment, the right kind of gas for London—certainly not for practical purposes." Now, in this long list which you say exists of places where a higher price exists than is proposed to be charged in London, I may take it that whenever an opportunity occurs you would be prepared to suggest to Parliament that they should be reduced to 3s. 6d. for 18-candle gas?

Witness: I should be prepared to give evidence, if I were employed, that the prices are too high, and that they should be reduced. I do not say exactly in the same way.

Cross-examination continued: There is one company in London whose capital is in the proportion of £4 to every ton of coal carbonized; the capitals of the other companies range from £4 up to nearly £11 per ton.

By Mr. MICHAEL: When I speak of Fifeshire cannel, I allude more particularly to the description spoken of by Mr. Romans in his evidence last year, obtained from the Lothian coal-fields. I do not know how much of that coal is raised every year, but the evidence given was that it existed in great abundance, and could be raised for a great many years to come to an extent far more than would be equal to the demand. I have not formed any approximate idea of the total quantity of coal in Fifeshire, but I have seen recent reports of geologists on the subject; the evidence is very conflicting. In addition to that, I may say that there are several patents now before the public for using very inferior materials for making the richest cannel gas that can be got. I am speaking of that as a sort of set-off against what some people speak of as to the probable exhaustion of cannel coal. Those materials are shale oils, bitumens, and matters of that kind, which are very cheap, and can be used with great success with a mixture of small waste coal. The experiments which I have seen are highly satisfactory, and the gas which they sometimes produce is of a very high quality, equal to any cannel gas which has been spoken of here. I know nothing of the total tonnage of cannel in the Fifeshire coal-fields, but there is a quantity which will last for a great many years.

The CHAIRMAN: We shall never come to an end if we go into the question of the probable exhaustion of cannel coal.

Cross-examination continued: About one million tons of coal are used annually in London for making gas, so that if my project for supplying 18-candle gas were carried out, it would require from 200,000 to 250,000 tons of cannel coal. I have proceeded upon the basis that three-tenths of the coal employed should be cannel; but if you get 18 candles illuminating power supplied all over London, you would not require anything like the same quantity of gas. I have no hesitation in saying that if the supply of gas were conducted on liberal terms, the public consumption would be doubled in ten years. It would possibly in that case require the employment of half a million tons of cannel at the end of that time. I know the prices paid by the Western Gas Company up to the last returns, but in Captain Gridley's return they make no mention of it, but leave their price blank. I am not sure that I know of a higher price in London than 25s. per ton. Any increase above that price would not disturb my calculation. I believe the Western Company use Lancashire cannel, or so called Lancashire cannel. There is a great deal of mixed coal in Lancashire, and a great deal of cannel that will not make the best gas. There are only one or two seams that will make far higher than 18-candle gas. I am not aware that the price of cannel is continuously increasing; I do not think it is the case. I base my calculation on the present price of the Lothian and Fifeshire coals, with no reference to the Lancashire cannel.

Re-examined by Mr. RODWELL: If Dr. Letheby has stated that he does not think it desirable to light London with cannel gas, I differ from him entirely. If the illuminating power of the gas were increased, the consumption of gas would be less; it is a question of the amount of light that London wants, with no reference to the quantity of gas required. If 18-candle gas were supplied, the whole system of burning, as far as the consumers are concerned, would have to be altered. It would be very injudicious to use the present burners; they would all have to be changed. In the published returns of the companies for 1866 the Western Company give the total sum paid for coal, but not the tonnage, so that I am not enabled to state the cost per ton. I think I have fixed a fair price for it. I believe there is a supply of both cannel and coal for gas purposes for many years to come.

The CHAIRMAN: We cannot go into that collateral inquiry.

Re-examination continued: Generally speaking, if the cost of coal is high, the value of coke is high also. In many cases, where a high price for gas prevails, it is really a restriction to its use. When gas-works were originally established, the prices were 15s. and 17s. per 1000 cubic feet of gas. No company could stand that. They paid no dividend, and were almost ruined until they found out their true policy—viz., to reduce the price; and the moment they reduced the price they realized a dividend. There were never higher dividends than there have been lately, when the prices have been lowered. When the prices were 4s. and 4s. 6d., the companies were all paying 10 per cent. It seems often a natural consequence that the low price of gas produces high dividends, and the high price of gas produces low dividends. According to my calculation, I said I should not give 10 per cent. on the whole of the capital; but I wish to qualify this answer, because I found it impossible to apply any reasonable rule that would satisfy any such exorbitant dividends as they have. I find the amount they must add to their net cost to pay that dividend ranges from 10d. in 1000 feet in one case to 2s. 6d. in another. They must add that to the actual cost of production, in order to pay the dividend allowed by the law on their capital; because in allowing this dividend the capital has not been taken into consideration. Parliament seems to have been satisfied with fixing a given rate without considering the capital. In some cases my calculation would work out to more than 9 or 10 per cent.;—12 and 13 per cent. in some cases. One of the greatest arguments for using rich gas in a place like London is that, in addition to the advantages of cannel coal as to light, it is self-evident that the smaller the quantity of gas consumed the less would be the heat and noxious vapour produced; so that it is advisable to use the coal which would give the greatest possible light. There is another advantage, also—there is greater purity in gas from cannel coal; much less injurious products escape; and there is less heat in the apartment, and less injury to ventilation. I find that whereas the Independent Company require 10½d. to pay the 10 per cent. dividend, the Western Company require more than 26d., the Equitable more than 23d., and so on. Those enormous variations are in consequence of anomalies in their capital.

Dr. *Edward Frankland*, examined by Mr. GROVE.

I am professor of chemistry at the Royal Institution, and have devoted my whole life to chemistry and to chemical subjects. I have had a great deal to do with the question of the supply of gas for the last 20 years, both in Manchester and in London, and have had opportunities of making experiments upon a manufacturing scale in gas-works.

Mr. GROVE: You have seen the 28th clause of the bill now before the committee, what is your opinion with regard to the illuminating power and the price at which gas should be supplied; in other words, how should the blanks be filled up?

Witness: I would fill up the blanks with regard to the illuminating power with 18 candle gas, and the price delivered to the consumers at 3s. 6d. per 1000 cubic feet.

Mr. GROVE: What are the modes of calculation by which you arrive at those conclusions?

Witness: I have taken three modes of calculation. The first is that one ton of Newcastle coal gives 10,000 cubic feet of 15-candle gas, that is 15-candle gas as measured by the new burner, not by the burner contemplated by the last Act of Parliament.

Mr. GROVE: But is it the burner that is contemplated in this bill?

Witness: It is described in the schedule. To convert this into 18-candle gas by a process of simple admixture, 7500 cubic feet of Wigan cannel gas would be necessary; that would be four volumes of 15-candle gas, plus three volumes of 22-candle gas, giving seven volumes of 18-candle gas. Now, 7500 feet of cannel gas requires 13·6 cwt. of Wigan cannel coal. Further than that, one ton of Newcastle coal costs, according to the average paid in the year 1864 by the metropolis gas companies, 15s. 3½d., and yields 10,000 feet of gas; 13·6 cwt. of Wigan cannel coal, at 25s. per ton (which, I think, is a very ample estimate for the price of delivery to the companies of London), costs 17s., and yields 7500 cubic feet of 22-candle gas; therefore 17,000 cubic feet of 18-candle gas costs, in material, £1 12s. 3½d., or 1000 cubic feet of 18-candle gas costs 1s. 10d. Add to that salaries, wear and tear, distribution, &c., as contained in Mr. Moor's return (p. 309 of the London Corporation Gas Bill Report), that comes to 1s. 5½d. per 1000 cubic feet. I may say that I have taken that as the lowest. I regard those charges as very heavy indeed in the metropolis gas companies, and therefore I take the lowest and not the average, that is to say, the expense in the Equitable Company, that makes the gross amount 3s. 3½d. From that is to be deducted the receipt from the sale of the residual products. First of all there would be two-thirds of a chaldron of Newcastle coke for sale, after leaving one-third for fuel for the retorts, that is worth 7s. 4d; the two-thirds of a chaldron of Wigan coke, which is the proper quality, is 6s., making together 13s. 4d.; then tar and ammoniacal liquor, 3s. 6d., which I get from those returns in the appendix, making together for the 17,500 cubic feet of gas, 16s. 10d., as the produce of the sale of the residual material, or per 1000 cubic feet 11½d., making the price of the gas delivered to the consumer 2s. 4d. But there must be added to this the loss from leakage, which I estimate at 12½ per cent. on the gas leaving the works. That would amount to 4½d. to be added to the amount last given, which gives a total of 2s. 8½d. as the cost of the gas to the company delivered at the consumer's burner. Therefore the net profit on each 1000 cubic feet of gas would be 9½d., which, upon a capital of £6 6s. per ton of coal carbonized (which is the average of all the companies, taking all their capital, original as well as subsequent) is equal to £6 3s. 1d. per cent. In the second mode of estimation I take the gross cost of the gas the same as in No. 1, that is to say, 3s. 3½d. per 1000 cubic feet; then I deduct the residual products from one ton 13·6 of coal and cannel, which, according to Mr. Moor's return, gives residual products worth 8s. 11d. per ton. This would amount to 13s. 11d. on that quantity of coal and cannel, or per 1000 cubic feet 9½d. This would bring the price of gas to 2s. 6½d. per 1000 cubic feet, to which 4½d. must be added for leakage, making the cost 2s. 10½d.

The CHAIRMAN: You said in the former case 4½d, I thought.

Witness: Yes; but the price here is a little higher, because those residual products are not so much. Now, both these calculations are founded on the assumption that the two gases are made separately—that is to say, the Newcastle coal gas and the Wigan cannel gas—and that they are afterwards mixed together in the gasholder; but this is a process, I believe, that no gas company would carry out—it is a very crude kind of process to carry out. The plan is to pass the coal gas—that is to say, the gas of a lower quality, or a portion of it, through the cannel gas retorts, whilst the gas is being made. By that process you save more than 33 per cent. of light; you get 33 per cent. more light from the cannel coal. I give this separate from the other calculations, inasmuch as it is somewhat theoretical in character, and it may be disputed. The process as here contemplated is by no means carried out to the extent that it might be, neither are the benefits derived so great, I believe, as they would be. No. 3 I estimate upon the process of mixing the gases in the retorts; one ton of Wigan cannel gives——

Mr. GROVE: What would be the reason of the difference in the result

supposing you mixed the coal, compared to the result when the coal is used separately?

Witness: The reason is this: when you are generating in a retort gas of a high illuminating power—that is to say, gas containing a large per centage of the hydrocarbons—you must have a retort at a bright cherry-red heat, and then all the gas in contact with the walls of the retort is being rapidly decomposed, so as it remains in the retort. Every second a certain amount of the illuminating constituents are being decomposed, and what is deposited on the inside of the retort is the result of the decomposition of those luminiferous products. Now, if a stream of common coal gas is passed through, the cannel gas is rapidly swept out, and thereby removed from the destructive influence of the red-hot sides; and there is a saving of about 33 per cent. in the case of the Wigan cannel coal, as I have proved by direct experiment.

Mr. GROVE: Now will you go to the experiment? Supposing those gases were mixed in the retorts?

Witness: Yes. One ton of Wigan cannel coal gives, when distilled in this way, along with 3·7 tons of Newcastle coal, 48,000 cubic feet of gas of 18 candle illuminating power; therefore, the cost of 1000 cubic feet of gas upon this method would be 1s. 8d., to which must be added the items in the other estimates, for salaries, wear and tear, and so on, making together 3s. 1½d. I then deduct residual products as in No. 2 (which is the worst form of estimate with regard to the price of production), 9½d., making the cost of the gas 2s. 4½d., to which again 4½d. would have to be added for leakage, making together 2s. 8½d., and leaving a profit of 9½d. per 1000 cubic feet.

Mr. GROVE: Have you made any calculation derived from what you have seen in actual practice or experiment with regard to the comparative cost of the light from cannel coal and Newcastle coal?

Witness: I have; and I have arrived at the result that the cost of light in equal quantity from the Wigan cannel coal or from the Newcastle coal is almost identical, but not exactly the same in London. And these are my data: One ton of Wigan cannel coal gives gas which, when burnt at the rate of 5 cubic feet per hour, produces a light equal to 4840 sperm candles, each consuming 121 grains per hour and burning for 10 hours. One ton of Newcastle coal gives a gas which, burnt under the same circumstances, produces a light equal to 3000 sperm candles, and hence the light per 1000 candles from the Wigan cannel coal is equal to 5·16s.; the price per 1000 candles from Newcastle coal is equal to 5·08s. But, if depreciation of coke at 2s. per chaldron be added to the price of the coal, which would make it 27s. per ton, then the price becomes 5·58s.; but the cost of purification and distribution of the light of 1000 candles, when obtained from Wigan cannel coal, would be reduced in the proportion of 22 to 15, because what you distribute is light and not gas. It is no use sending 1000 cubic feet of gas through the mains if you produce only a few candle-lights from it. Whereas if you give rich gas, producing 18 or 20 candle-light, then you obviously send a very much larger amount of light through the same mains. Therefore the figure would be reduced by 6d. per 1000 candles, which would bring the cost of the 1000 candles from the Wigan cannel to 5·08s., or exactly the cost of the same amount of light from the Newcastle coal.

Mr. GROVE: Now, is there any difference with regard to the production of gas from rich coal, such as cannel or from Newcastle coal?

Witness: With regard to going a considerable distance, the further the locality where the coal to be used is from the coal-field, the greater is the advantage in using rich coal or cannel coal.

Mr. GROVE: Have you made any calculation, on that basis, of the less amount of expense for carriage if the coal gives you a greater amount of gas per ton?

Witness: Inasmuch as the carriage is founded on the weight of the material, the following calculation supplies that to a great extent:—In 1 ton of Newcastle coal you get 3000 sperm candles; and in 1 ton of Wigan cannel coal you get 4840 sperm candles; in 1 ton of Methill cannel, which is a Scotch coal, you get 5315 sperm candles; in 1 ton of Newcastle cannel you get 5047 sperm candles; in 1 ton of Lesmahago you get 8496 sperm candles; and in 1 ton of Boghead coal you 13,928 sperm candles. Consequently, those rich cannel coals will bear much heavier carriage than the poorer Newcastle coals.

The CHAIRMAN: In making your estimate I presume you have calculated each coal at what it costs the companies in London?

Witness: Yes, in my previous estimates.

The CHAIRMAN: Carriage included?

Witness: Carriage included, and delivery at the works.

Mr. GROVE: As to the effect of noxious gases, or gases which are not used up, so to speak, in the combustion, is it better for that purpose to use a better class coal, or rather is there a less proportion of them according as you employ a better class of coal?

Witness: Certainly, if you want a light of 20 sperm candles, it is far preferable that you should get that light from an 18 or 20 candle gas than from a 12-candle gas; because all the impurities of combustion and so on which you have during the combustion of the 12-candle gas must of necessity be very much greater than during the combustion of the 20-candle gas, supposing you get the same light from both, inasmuch as you have to use much more of the poorer gas. In that way the inhabitants of Edinburgh, for instance, at the present time get a greater amount of light with one-half the heat and general deterioration to the atmosphere of their rooms, and with a still smaller proportion of deterioration as regards the sulphur compounds present in the gas.

Mr. GROVE: Would this enable gas of the better quality, which gives more light for a smaller proportion of actual gaseous product, to be introduced into smaller rooms where the ordinary gas would be unwholesome?

Witness: Undoubtedly. As a consumer of gas for seven years in Manchester, and since then for nine years in London, I have had the opportunity of comparing the comfort with which one can burn the two gases in a drawing-room; and certainly the difference is most striking between the combustion of gas in London and the state of the atmosphere there as compared with what it is in other places where the gas supplied is purer.

Cross-examined by Mr. DENISON: I did not make the statement that cannel coal is less impure than Newcastle coal. I spoke of impurities generated by the combustion of the gases, and not of the coals themselves. My experience of the gases made from Wigan cannel on the one hand, and from Newcastle coal on the other, leads me to believe that the impurity in the gas from the Newcastle coal is considerably greater than in the gas from the Wigan cannel. I should say that the latter, as a rule, contains considerably less sulphur than the former. I have made experiments upon all these things, but I have never superintended the conduct of any gas-works.

Mr. DENISON: In fact, do you know whether any company in England does manage to get 10,000 feet of 15-candle gas out of a ton of Newcastle coal?

Witness: I think that there can be very little doubt about it.

Mr. DENISON: But I should like to know whether you know the fact. You scientific men, you know, are always confident.

Witness: I take the illuminating power by those burners of the gas produced by London companies who do not use any cannel. I am quite aware that the illuminating power is in some cases not so high as it ought to be, because the quantity of gas produced is probably greater than that which I have mentioned.

Mr. GROVE: But, as a matter of fact, do you know of any company which uses Newcastle coal obtaining 10,000 cubic feet per ton of 15-candle gas?

Witness: The Great Central, I believe, as appears from this return, use no cannel. They pay, at all events, 14s. 10½d. per ton for their coal, and there is no cannel mentioned here. Now, I find from Dr. Letheby's return of the gas supplied by this company in the City that the maximum illuminating power which they get out of this coal, and they have got it on many occasions, is 16·71 candles.

Mr. DENISON: But how does that prove that they get 10,000 feet of that gas out of a ton of coal?

Witness: That I cannot possibly prove. I can only prove the quantity of the gas which I have myself got out of it.

Mr. DENISON: In fact, all this evidence of yours is founded upon experiments of your own, I understood?

Witness: Certainly not; the greatest part of it is founded upon the returns of Mr. Moor.

Mr. DENISON: But your experiments are, of course, on a very small scale compared with what the gas companies do?

Witness: Of course, they were made with one retort only.

Mr. DENISON: And this also has to be taken into account, that the gas must generally be supplied, to be safe, a good deal above the number of candles specified in the Act of Parliament, must it not?

Witness: If it is supplied higher they will get a higher price for it.

Mr. DENISON: That may or may not be according to the testing, but the fact is so, is it not?

Witness: Yes.

Mr. DENISON: If a certain illuminating power is prescribed, the companies, in order to be safe, must make their gas of a considerably higher power?

Witness: If they are to be fined for going below the prescribed illuminating power, then I should think it would probably be necessary for them to keep up about a candle beyond.

Mr. DENISON: Does the illuminating power diminish at all with distance?

Witness: Yes, it does sometimes.

Mr. DENISON: I should like you to tell us how much?

Witness: It is impossible to say how much in every case, because it depends upon the way in which the mains are laid, and the workmanship of putting together the pipes, and also upon the quality of the pipes themselves. The leakage is due to the diffusion of the gas through those pipes, and the introduction of a small amount of atmospheric air in the opposite direction into the pipe, and that causes a slight deterioration in the quality of the gas, but I cannot say that I have made any experiments myself upon that subject. There is a very great difference of opinion as to its amount, or even as to its extent, amongst gas engineers.

Mr. DENISON: But as far as your opinion goes you do not think there is that difference?

Witness: I think there is some little difference; I will not say how much, but I think it is appreciable.

Cross-examination continued: My first results as to the cost of the manufacture of gas do not differ materially from the others. They give a dividend of £6 3s. 1d. per cent. upon the capital, which is estimated to be £6 6s. per ton of coal consumed. I suppose it must necessarily follow that if, by reason of the cost of their works, the capital of any of the companies works out higher than £6 6s. per ton, they would get a lower rate of dividend, according to my figures. The £6 6s. per ton is the average capital of the whole of the companies.

The CHAIRMAN: That includes the borrowed capital as well as the share capital?

Witness: I understand that it includes all forms of capital. It is a total capital of £5,647,901.

The CHAIRMAN: You have taken the capital, you say, from the return you hold in your hand, and you have estimated it, upon the average, to amount to £6 6s. per ton of coal carbonized. Does the return show only the share capital, or the aggregate share and borrowed capital of each company?

Witness: I am afraid I cannot answer that question, as I am dependent upon this table for information, and this table says—"The capital represented by each ton of coal." I presumed that it was both, but I did not investigate that point. It is the capital actually employed, as I understand, whether share or loan.

Mr. GROVE stated that he was instructed that these figures included both the borrowed and the share capital. (To witness:) Is there any specific decrease in the illuminating power of the gas with the distance, other than that which may be occasioned by leakage?

Witness: Certainly not.

Mr. GROVE: Of course, then, the amount of decrease must be dependent, so to speak, or must be in a ratio with the imperfection of the tubing?

Witness: Quite so. There is occasionally a decrease, owing to another cause which ought not to exist. If the gas is sent warm into the mains there is a condensation of hydrocarbon, naptha, and so on: that is a defect.

Mr. GROVE: Then, in point of fact, the decrease would not be a quantity easily reduced to an estimate, because it would depend upon the state of the gas-pipes and stop-cocks?

Witness: Yes, certainly. It differs in the mains of the different companies, and in some cases it makes a very considerable loss; in fact, I have had to allow here 12½ per cent. for the leakage. It is not the leakage of the gas which occasions the diminution of the illuminating power, but the admission of atmospheric air by diffusion in the opposite direction, for wherever the gas goes out, air must come in in the place of it. You must have air passing in, if you have gas passing out, according to the law of diffusion.

Mr. GROVE: Where would be the points where neglect would be of importance in increasing leakage?

Witness: I think the joints are the most important parts, because the pipes themselves are generally well tested by hydraulic pressure previous to use. I think if the pipes were well attended to the diminution in the illuminating power would become insignificant.

Re-examination continued: The experiments I made as to the illuminating power of gas from Newcastle coals were made at gas-works, and on the ordinary scale of making gas.

Mr. MICHAEL: I understood you to say that any deposition of hydrocarbons in the pipes could arise solely from the heat of the gas admitted to those pipes.

Witness: It could only arise from the admission of the gas at a higher temperature than the temperature of the mains themselves.

Mr. MICHAEL: Can you tell me through what length of mains it would be necessary that that gas should pass before it came to the same temperature as the ground in which it was? Supposing it were admitted, as you say, heated, and had to pass through a mile of mains, do you consider that under any circumstances that would be sufficient to bring the gas down to the temperature of the earth?

Witness: Of course that would very much depend upon the velocity at which the gas was going and the diameter of the main, but I should think there would be established something like an equable temperature in a mile.

Mr. MICHAEL: Suppose the gas to be stored for ten hours in a gasholder, is it possible that it would then remain sufficiently heated to fulfil the conditions which you named?

Witness: That is quite possible.

Mr. MICHAEL: After remaining there ten hours, it would still be so hot as to deposit the hydrocarbons?

Witness: Do you mean ten hours after the gas in the retorts is shut off from it?

Mr. MICHAEL: Quite so.

Witness: I should say not, except in summer; but in summer it might be so when the sun was shining on the gasholder. If the gas be properly cooled in the refrigerator, no time need elapse before it is admitted into the supply-main, supposing the refrigerator had sufficient power, but sometimes that is not the case.

Mr. MICHAEL: Then it would be only under exceptional circumstances that the gas would be so hot as to deposit hydrocarbons?

Witness: I think not always exceptional. I have known gas intentionally admitted into the holder at a high temperature, in order that it might pass into the mains warm; the object being to increase the illuminating power of the gas. A greater illuminating power is obtained at some distance from the works if the gas is passed in this condition, because it is then, to some extent, naphthalized gas.

Mr. MICHAEL: Can you give me any idea as to the time which should be allowed to elapse after the manufacture of gas, before it is admitted into the mains so as to reduce it to a proper temperature?

Witness: I should say that from six to ten hours would be amply sufficient, supposing the gas were no longer flowing into the holder; but if there is a constant stream of gas flowing into the holder, there is no saying—I can give no guide.

By Mr. GROVE: If the manufacture is properly conducted, the temperature of the gas as it arrives at the holder is that at which it ought to go into the mains. When it does not do so it must be an exception, either arising from negligence or from the design of the gas producer to give a better illuminating power, in doing which he runs the risk of producing naphtha in the pipes, which has to be pumped out. It is not desirable to send gas through the mains naphthalized in this way. There is an advantage in naphthalizing gas just before it gets into the building and is consumed.

Mr. *George Wilson Stevenson*, examined by Mr. RODWELL.

I am an engineer, residing in London, and for the last 20 years have devoted my attention a great deal to the gas question. I am engineer to several companies, and also a lessee of gas-works. I have been engineer to the corporation of Halifax for the last ten years. I reconstructed their gas-works and managed them for six years. I am also engineer to the Aldrington Gas Company established last year for the supply of Brighton. The maximum price for gas allowed by that company's Act of last session is 3s. 6d. per 1000 cubic feet, and the illuminating power is 14 sperm candles. I was examined in 1866 on the Metropolis Gas Inquiry. In my judgment gas can be made in London at 3s. 6d. per 1000 of 18 candles illuminating power, reserving a profit of 10 per cent. to the makers. I have made a calculation to prove that quite independent of the two preceding witnesses. I have taken the population of London as the basis of my calculation as to the capital required, which calculation is confirmed by my observation and knowledge of other cities and towns. It is well known that the capital required for the construction and carrying on of gas-works varies from about 16s. to 20s. per head of population. I have assumed the higher figure for London, and I have supposed that an expenditure of £3,000,000 sterling would amply suffice for the construction of works in suitable positions in the outskirts of London, and would supply working capital to carry on the gas supply of the metropolis. The reason I select the maximum figure of 20s. instead of taking an intermediate figure between 16s. and 20s. is that perhaps the cost of works in the neighbourhood of London would be as high as they would be anywhere. In constructing works, I always take population into consideration. I have not constructed any works at Brighton. I am engineer to a company which obtained an Act to supply Brighton last session, but they have not commenced the construction of any works. That is a company originated to compete with the two existing companies.

Mr. RODWELL: What are the gas-works which you have constructed which enable you to speak with so much confidence as to this 16s. or 20s.?

Witness: They are all comparatively small works. There is nothing to compare with London. There is a comparatively small work for Clayton, Allerton, and Thornton, in the neighbourhood of Bradford.

Examination continued: The average capital required per head would be much less in a large place, because the expenditure in mains would be less. I do not think the cost of stationary plant would be less, because that is exactly in the ratio of the gas required to be produced; but in proportion as you have a large consumption on each mile of mains, the cost of pipeage would be very much lessened. I take the population of London at 3 millions; the capital required would therefore be £3,000,000, and the dividend, at 10 per cent. thereon, would be £300,000. I have assumed that the gas to be supplied has an illuminating power of 18 candles, to manufacture which would require seven-tenths of a ton of Wigan cannel, at 27s. per ton, which is the companies own figure, though I think it might be obtained for less. That would be 18s. 10d.; and to that I add three-tenths of a ton of Newcastle coal at 16s., which would be 4s. 5d.; 12 bushels of coke for fuel, with which to carbonize the coal, at 3d., would be 3s., making a total of 26s. 3d. I then deduct the residuals. The engineers of the gas companies in their estimate say that the value of the Wigan coke is very much less than that of the Newcastle coke. I have never found in my sale of coke that it has been less. I have always sold Wigan cannel coke at the same price as Newcastle coke, and I assume here that it will be sold at the same price. I have taken their figure, which is 3d. a bushel. I should mix Wigan and Newcastle coke, and sell it at 3d. a bushel. I am telling you what I know from my own working. It was stated last year by Mr. Cleminshaw, of the Manchester Gas-Works, that Wigan coke was equal to Newcastle coke. That was given in the evidence of 1866. I take 36 bushels of coke at 3d., that is 9s.; and four bushels of breeze, 2d. (their own figures); ten gallons of tar, 11d.; ten gallons of liquor, 2d.; making a total of 10s. 3d., which, deducted from 26s. 3d., the previous total, leaves 16s. as the value of the raw material per ton. Then the gas made from 7/10ths of a ton of Wigan cannel coal, which yields on the year's working 10,200 feet per ton, and from 3/10ths of a ton of Newcastle coal, which will yield on the year's working 9500 feet per ton would be 9990 feet; and 9990 feet at 16s. would make the cost of the gas for raw material alone 19·21d. per 1000 feet. That is 18 candles. Then to this must be added 15 per cent. for loss by distribution, waste, and fraud, and so on, amounting to 2·11d. and 12·61d. for manufacture, management, repairs, rates, establishment, and all incidental expenses, making the total cost of the gas 33·93d.—or, say, 2s. 10d. per 1000 feet. That is the cost of gas at the consumer's burner per 1000 feet, wherever it may be—anywhere over 1000 yards from the works.

Mr. RODWELL: Taking this yield of cannel and Newcastle coal, are you dealing with facts within your knowledge, or is it mere speculation on your part?

Witness: They are facts within my own knowledge. I take the statement of the companies engineers as to the yield of Newcastle coal being 9500 feet.

Mr. RODWELL: But your own experience would confirm it?

Witness: I have never worked Newcastle coal, and I cannot say what is the yield of it. I have experimented with it, but never worked it on a large scale. I am satisfied that my calculation of a yield of 10,200 feet per ton on the year's working is fair, and that the allowance for loss is a liberal one. Some companies are working under 10 per cent., and there are companies in London working considerably under 12·61d. for manufacturing, management, &c., expenses. The present consumption of gas in London is about 9,000 million cubic feet per annum; 8d. per 1000 cubic feet upon that quantity will give exactly £300,000, which is the required dividend. Then 2s. 10d. for the cost of the gas at the consumer's burner, plus 8d., is 3s. 6d., the proper selling price for 18-candle gas in London. I think it might be made to sell for less. I am aware of the mode in which at the present time the metropolis is districted. The effect of that arrangement is the consumers are prohibited from enjoying the benefits of competition, whatever those benefits may be. Virtually London is supplied by one company, and the whole of the companies together ought to be treated as one company, and the consumers protected as they would be if one company only were supplying London. Supposing one company alone were supplying London, the price of gas would be very much lower than it is now, and that is the assumption upon which I found my evidence. The cost of management and all superintendence is pretty nearly constant after you get to a certain point in the manufacture, whereas the cost of making gas per 1000 cubic feet will, of course, bear an exact proportion to the quantity made. But at the present time we have thirteen different companies in London, no one of which can invade the district of another, and no consumer in one district can come to the district of another company and say, "You are supplying gas at a lower price than the other company which is now supplying me, and I want to have gas from you." They must take exactly what the company occupying the district chooses to give them. I say that Parliament ought to step in and protect the consumers in a case of that kind. Lately the South Metropolitan Company were supplying the same gas at 3s. 4d. on one side of the street as the Phœnix Company were supplying at 4s. 6d. on the other side of the street. I say that that is a state of things which ought not to be permitted to continue. There is a diminution both in the quality and quantity of gas by its travelling a distance in the mains. Until the gas acquires the temperature of the mains through which it is being passed it continues to deposit its heavy hydrocarbons; when it acquires that temperature it ceases to deposit, and it is pretty well understood now among engineers, and indeed it has been ascertained by experiments in different towns, that at a distance of 1000 yards from the works, or from that to a mile, the gas has deposited as much of its illuminating property as it ever will do, and after that, through four, or five, or six miles of main, it does not continue to lose its illuminating power. I have taken all these facts into consideration in making my calculations. There are other means of increasing the illuminating power of gas than by the use of cannel coal; shale oil or bitumen may be employed for the purpose. I think at present no other mode would be so available; but if the price of cannel were very much to increase, there are other means which could be profitably employed. It is a fact that there are improvements going on in the manufacture of gas. I do not think there is likely to be a scarcity of cannel coal. I think if 18-candle gas were sold in London it would be used in places where gas is now studiously shut out. It was stated in the report of the committee last year that the gas supplied to London is not so pure as it might be. That inconvenience would be to some extent removed if this cannel coal were used, and the illuminating power increased, but it does not matter whether Wigan cannel, or any other cannel or Newcastle coal be used; unless the gas be properly purified it will be sent out to the consumers with its impurities contained in it; but the whole question of purifying is proposed to be referred to a gas board. Cannel coal gas requires quite as much purifying as other gas. The great reason why the gas in London is so impure at the present time is that the companies will not use lime. They use oxide of iron, and satisfy themselves with that purification. The use of lime is objected to because of the difficulty of dealing with the "blue billy." They may get a good deal of sulphur out of gas by using other means, without using lime, if they wish it, with ammoniacal liquor. To a certain extent it will bring out the sulphur compounds. From the improvement in burners, what was equal to 12-candle gas in 1860 is equal to 14-candle gas now. The quality of the gas remaining the same, it is improved in the process of combustion. A burner has been discovered since 1860 which develops the quality of the gas fully; that is to say it does not restrict it. In the year 1860 this burner with the large holes, and a burner suitable for testing 14-candle gas was not known; and since 1860 this burner has been discovered which develops the full illuminating power of the gas. If that burner had been known in the year 1860, the possibility is that a higher illuminating power might have been fixed in the 1860 bill. This is entirely to the advantage of the companies. If we were to revert now to the burner of 1860 we should have 12-candle gas instead of 14. The companies can, therefore, supply more 12-candle gas now than they could before at the same price.

Cross-examined by Mr. DENISON: I do not think scientific people have given the difference between the results of the two burners. I know the companies said last year that they were willing to give 14 candles by the new burner. Improvements are constantly going on in the manufacture of gas.

Mr. DENISON: But can more good gas be made out of a given quantity of coal than was made in 1860?

Witness: I think not. Clay retorts were in use then, and there has been no means of making more gas than by a proper use of clay retorts. I do not anticipate we shall ever get more gas out of a ton of coal than we are now getting.

Mr. DENISON: Is more gas got from a ton of coal now than was got in 1860?

Witness: No, but I do not look upon coal as the only material from which to make gas.

Mr. DENISON: I know that, but we are dealing with facts, not with prophecies. Is this other stuff of yours—bitumen and shale oil—yet used in any large way in making gas?

Witness: I think not. A new discovery does not jump into universal use at once, especially among London companies.

Cross-examination continued: I was engineer to the Halifax Corporation, to whom the gas-works in that town belong. Their maximum price is 4s., the minimum 3s. 2½d., and the average 3s. 7½d. per 1000 cubic feet. The price charged to all consumers who burn less than 20,000 cubic feet per quarter is 4s. The minimum illuminating power is 14 candles, but they practically give 16. The average cost of coal is 11s. 3d. per ton. In 1861 it was a good deal less—is was then 8s. 9½d.; at present the cost of coal and cannel combined is 11s. 6d. The coal used is Yorkshire coal and Wigan cannel. They did not use cannel in 1861.

Mr. DENISON: You have made an estimate of the cost of gas-works in London upon the basis of £1 per head of the population. What was the population of Halifax at the time when your works were made?

Witness: I had better give you the capital and the population.

Mr. DENISON: You had better answer my question, I think.

Witness: I really cannot tell you. The population in 1861 would be about 45,000, or perhaps 50,000.

Mr. DENISON: Now then you may give me the capital.

Witness: I do not know what it was in 1861.

Mr. DENISON: This [handing a paper to witness] will tell you, I suppose?

Witness: I have not seen this before.

Mr. DENISON: I think you have.

Witness: The capital was £91,165, and the population supplied about 45,000 or 50,000.

Mr. DENISON: A paper has been put into my hands—it may be right or wrong—which calls the population 37,000.

Witness: That is the parliamentary borough; that is not the district supplied by the gas-works. The population of that district is now nearer 70,000.

Mr. DENISON: How much have the corporation expended since 1861—do you know?

Witness: I can tell you what their present capital is; it is £140,000 for the supply of about 70,000 people, very likely. But I should like to explain that, as you have asked me about that capital; I should like the committee to know that the corporation bought the works from a company when that company was *in extremis*, and paid £37,500 for works which were not worth £12,000, so that they are saddled with a very large capital which is absolutely dead, and, in addition to that, a considerable portion of this £140,000 represents expenditure for the future. It is not yet productive.

Mr. DENISON: You say the works are not worth that, which sounds extraordinary for the corporation. I suppose somebody thought they were worth it.

Witness: The corporation knowingly paid a very large sum of money in order to extinguish the right of the company, and to become themselves the manufacturers and suppliers of gas. They gave a great deal more than the share and loan capital of the company. It is so stated by the gas company in their correspondence with the Board of Trade. In one of their replies they reprobate the idea of taking the metropolitan gas-works by paying them 6 per cent. for their capital; and the companies proceed to show that in all those towns—Birkenhead, Burnley, Bury, Darnley, Halifax, Macclesfield, and Oldham—where the works once belonged to companies and were purchased by corporations, a very much larger sum has been paid than the share capital, and in Halifax I see it is stated that for every £100 of share capital the corporation paid £240.

Mr. DENISON: Then what is the inference drawn from it? Why, that "from the prices paid in these instances it is clear that no other basis could have been adopted than that of a secured income of 10 per cent." Is not that so?

Witness: The company were not making 10 per cent. at the time nor paying 10 per cent. I put this in to show that the corporation paid a great deal more than the share capital.

The CHAIRMAN inquired what bearing this had upon the question of £1 per head of the population being sufficient for the gas-works at Halifax.

Mr. DENISON said the witness volunteered the statements, and they were not given in answer to questions put by him.

Cross-examination continued: I am the engineer of the new company, which obtained an Act last session to supply Brighton. I do not know whether the capital of that company is yet taken up. I have never attended any meeting of the directors, and knew nothing at all about it. We did not get our bill with the 3s. 6d. price upon the basis that we were to be a competing company. I think it is stated in the evidence in the metropolian inquiry of last year that a further capital was required at Brighton. The Brighton and Hove Company were in Parliament asking for further capital. The committee thought the company ought not to be permitted to extend their works where they were at Hove, and the company could not get the land which they wanted at Aldrington. We had the land at Aldrington, and the House of Commons empowered us to raise capital to erect the works and to make the necessary extension.

The CHAIRMAN suggested that the witness could not know the grounds which influenced the decision of the committee.

Cross-examination continued: We proposed 3s. 6d. as the price to the committee, and Mr. Hawksley supported it. We got our bill, and one of the other companies being in Parliament at the time asking for further powers as to capital and land, the same maximum price and minimum illuminating power were imposed upon them which we were seeking voluntarily to put ourselves under. They are a company in existence with works. I have seen their balance-sheet, but I do not know what effect that last reduction of price has had upon their dividends.

Mr. DENISON: You being the engineer to the new company, and having seen the balance-sheet of the existing company, tell the committee that you do not know what the effect of that balance-sheet is?

Witness: I do not know. I have not had the opportunity of analyzing it and comparing it with other balance-sheets.

Mr. DENISON: I am no great conjuror at these things, but I cannot help understanding it, and I do not think you can. Try if you cannot find something about dividend in that paper.

Witness: Do you mean "Appropriation of profit—dividend for the half year"? They may state anything they like in the way of appropriation of profit.

Mr. DENISON: Perhaps you will let the chairman and the committee see it, and see what they can make of it.

Witness: I should tell you that there is a return made for the six years previous working of that company.

Mr. DENISON: You said you could not ascertain the dividend of the company for the last year.

Witness: I did not say that, and I did not mean it.

The CHAIRMAN stated that he understood the witness to say that he (the witness) was not competent to form an opinion as to whether this paper was an accurate description of the accounts of the company, or whether the circumstances of the company would have enabled them, if they had been so disposed, to declare a higher amount of dividend.

Mr. DENISON (to witness): Having looked at that paper, I ask you again the question, do you believe that their dividend was more than 5 per cent. last half year?

Witness: I do not believe that they declared a higher dividend than 5 per cent.; but I should like to have an opportunity of analyzing the accounts.

Mr. DENISON: Having looked at that paper again, have you any doubt that they were only able to pay that dividend at the rate of 5 per cent. by taking something from their reserve-fund, the reserve-fund, as I remember, being less than it was before?

Witness: I see there is a balance carried to the next half year's account.

The CHAIRMAN said he did not think the learned counsel was entitled to expect the witness to express an opinion upon accounts which he had never seen before.

Cross-examination continued: I was examined last year upon the metropolis gas inquiry, and stated that the price of gas should be regulated, in reference to the 10 per cent. dividend, on the capital of the companies—not as it is, but as it ought to be. That is my present view. I said last year that it would be a hardship upon those who had bought shares in the metropolitan gas companies since the passing of the Act of 1860. I still think so. I think it is a hardship to a certain extent, but people invest their money, and they have to submit to great hardships. Gas companies are not the only companies in which capitalists invest money, and do not get the return they expect. That is what I mean by hardship. In the Brighton and Hove Company's case last year Parliament reduced their capital. I do not know of any case in which Parliament has arbitrarily reduced the dividends upon old capital. I approve of the districting arrangement; I think it is a necessity in London I think there should be uniformity of price for gas of the same quality throughout the metropolis. I approve of there being a maximum price fixed, and a maximum dividend, and of an arrangement for the reduction of the price when the maximum dividend is reached.

Mr. DENISON: When one company has reached that position so as to be obliged to reduce its price, do you think that all its neighbours for the sake of uniformity should be obliged to reduce their prices too?

Witness: I am not prepared to say what would be the actual operation of it. I should prefer to attack the capitals of the companies, but that is not proposed to be done by the bill, and therefore I cannot give evidence upon that point. The maximum price and dividend require to be regulated from time to time by coming to Parliament. I know that the Independent and some other companies got Acts last year for extending their works and raising capital; they were obliged to do so inasmuch as by the Act of 1860 they are bound to supply. I do not know that the Imperial Company in consequence of the limitation of dividend upon their new capital to 7 per cent. have been unable to issue that capital. I can easily conceive that they have not issued it, but not on that account. It has been utterly impossible to float capital in any company lately, no matter how solvent it might be.

Re-examined by Mr. RODWELL: The Halifax Corporation gave something, as it were, for the goodwill of the business, and to get rid of the old company. The capital, therefore, invested by them does not at all represent what would be necessary for the construction of works to supply the place. It is a very large capital for the business they are doing, but it is all accounted for. It is not an exceptional case. There are two companies in London, the South Metropolitan and the Independent, supplying gas of nearly 14 candles illuminating power for 3s. 4d., and paying 10 per cent. dividends, showing that the price of gas is determined, not by the cost of production, but by the amount of capital.

Mr. RODWELL: My learned friend says that is a hardship on persons investing. Is not that a hardship which is common to persons who invest in anything else?

The CHAIRMAN intimated that this was rather a matter for argument than for evidence.

Witness: If I were to invest capital in a gas company in London I should search out the company which had the least capital for the business it was doing.

Mr. RODWELL: I understand that your view is, that you think it is a hardship upon the consumers that they should have to pay for the enormous capital which some of the companies have unnecessarily raised?

Witness: I do think so.

THIRD DAY—MONDAY, MAY 27.

Joseph Heron, Esq., examined by Mr. WEBSTER.

I am town-clerk of Manchester. From the establishment of the corporation the supply of gas has been in their hands. The works were first established by the Commissioners of Police, who represented the ratepayers, under the Local Police Act, for the supply of the township of Manchester, and the adjoining districts. There is no limit in the Act to the district which the corporation are authorized to supply, but as a matter of fact the corporation supply not only the township of Manchester, and the four other townships which are included in the municipal corporation, but a considerable extent on most sides of the borough; there is the borough of Salford on the other side of the river, and, of course, on that side of the river the corporation do not supply gas. The gas-works were started about 28 years ago. In the first instance, for a very short period, the surplus profits were applied to the reduction of the township rates; but very shortly after the establishment of the gas-works, and while they were under the management of the Commissioners of Police, power was obtained from Parliament to apply the surplus profits in the making of improvements. As a financial transaction it has been successful. Nearly the whole of the improvements that have been made in the city of Manchester have been paid for out of the gas profits, and I have a return here showing that since the year 1844 upwards of £700,000 have been paid out of the gas profits to the Improvement Committee. Much more than that sum has been expended, but it has been borrowed money. We are constantly borrowing and constantly repaying; we are under the usual obligation to repay 5 per cent. on the amount borrowed.

The CHAIRMAN: You need not go into that.

Mr. HOPE SCOTT: It is rather material. Is all that correctly stated in the printed correspondence?

Witness: It is correctly stated, and is evidently taken from our published accounts. It is in the printed correspondence "Memorandum with respect to Manchester." It is there stated that the debt is £347,472. The amount of capital, as shown by the last annual account, is £547,854—that is adding the debt to the surplus assets in fact. The paper goes on to show what has

been paid off, and that is correct, too. But the amount of capital, on which the corporation only are entitled to obtain a satisfactory per centage, is really £547,854. You may call it in round numbers £600,000 with the floating capital.

Mr. WEBSTER: At page 21 I observe it is stated that a sum of no less than £462,711 of the capital of £810,183 really invested in the concern has been provided out of the profits. Is that correct?

Witness: I have no doubt it is correct, because it is evident that this paper has been prepared from the published accounts. I have not examined, nor have I the means of stating exactly what has been paid off. The price of gas is now 3s. 2d. per 1000 cubic feet, subject to a small discount of 1d. per 1000 feet when the consumption is upwards of 500,000 cubic feet. Outside the city there is an additional charge of 6d. per 1000 feet, subject to the same deduction. The corporation think they have a perfect right to have from those who choose to take the gas outside the city what they consider is the fair market price of the gas. They think 3s. 8d. is a very reasonable price, and a low price, in fact, for that quality of gas. Of course the parties may take it or not as they please. That we do not charge an excessive price is plain, because in many instances large consumers outside the city in possession of private gas-works have abandoned those works to take gas from us. That is frequently the case inside the city too; in fact, there are very few private gas-works. The gas-works really belong to the inhabitants of the city, who run the risk of accidents and all contingencies, whereas the inhabitants outside the city have no liability whatever.

By the CHAIRMAN: The illuminating power at Manchester is 21 sperm candles. The last report of the chemist employed by the corporation states: "I have the honour to report to you that the average illuminating power of the Manchester gas during the past year has been equal to 21·6 sperm candles, consuming at the rate of 120 grains per hour, the consumption of the gas having been reduced to a constant standard of 5 cubic feet per hour. The photometric observations have been made daily in the centre of the town, and at the Rochdale Road gas station. The gas has been tested daily for sulphuretted hydrogen by the ordinary tests, and in addition to this has been continuously led through a test solution, so as to determine the absolute quantity of sulphuretted hydrogen in each 1000 feet of gas; and has been reported daily for the ordinary tests, and fortnightly for the continuous test. On very few occasions has the impurity been present, and then only in the most minute quantity. The gas has contained very little tarry matter or naphthaline, and the ammonia (always found in more or less quantity in gas) has been reduced to a minimum. The gas has been, as I have had occasion formerly to express myself, remarkably pure and clean." That is the report of Mr. John Leigh, the chemist employed by the corporation. He is constantly employed, and receives a salary. He is a man of considerable scientific acquirements, and a member of the College of Surgeons.

By Mr. WEBSTER: The profit for the year 1866, without taking credit for depreciation, was £52,553; the depreciation which had been previously taken off was £13,817. It is calculated on a different per centage in respect to all the property of the gas-works. They deduct a different per centage, according to the character of the property. That makes a total of £66,370. That is the amount of profit, but a very small portion of that—only something like £20,000—came to the corporation for improvements last year, because out of that we paid for interest £13,282 13s.; liquidation of mortgage debt £19,784; and then the surplus that came to the Improvement Committee is reduced to £19,516 odd. The total amount of gas-rental received within the city was £139,683 8s. 2d.; outside the city, £29,106 15s. 8d.

By the COMMITTEE: The quantity of gas sold was between 1100 million and 1200 million—that makes a total of £168,790 3s. 10d.; then for coke, tar, and ammonia water, £30,133 3s. 6d. The produce of coke was about 5s per ton on the average; of tar, about 20s. per ton; ammoniacal water, 8d. per degree, and it was usually sold at 6 degrees, or 4s. per 1000 gallons.

By Mr. WEBSTER: I believe the price of coke is rather low compared with other places; but I cannot speak positively. Just now the coke has been tolerably well disposed of; I do not know that there is any excessive quantity on hand. Sometimes the quantity accumulates very much. In 1866 we could scarcely sell it at any price. Coke is not so saleable in Manchester as in many other places.

By Mr. RICHARDS: We use both coal and cannel in the manufacture of gas.

By Mr. WEBSTER: The proportion of coal is about 33 per cent. of the quantity used. The amount paid for cannel coal is shown in the return. That must include coal as well, I think. It is stated that the amount paid for cannel coal was £79,021 15s. 11d. in the year. The price of cannel during the year has averaged 15s., and that of coal 10s.; making an average of 13s. per ton.

By Mr. HOPE SCOTT: I cannot give the number of tons, but it is a matter of easy calculation.

By Mr. WEBSTER: I do not know that Manchester has any advantage in respect to the residual products. I only know the prices we obtain ourselves. There is no question that the consumption has increased in a very extraordinary manner; and, although the reductions from time to time have apparently diminished the profits between £11,000 and £12,000 a year, each reduction has been comparatively small—much smaller than was anticipated. The consumption is still increasing. We have a bill now waiting the Royal Assent, by which we have been forced to take powers to borrow £250,000 for the purpose of extending our gas-works; and, in the course of four or five years, I expect we shall have almost to double those works if the consumption goes on in anything like the same proportion as it has been going on during the last few years. The manufacture of gas, when modern improvements are taken advantage of, is a very profitable business. I think it is very likely that gas would be more economically manufactured in the hands of a corporation than by companies, because where the inhabitants themselves are the manufacturers of the gas, and are interested in the result, they would be more anxious to increase the profits. At the same time it is very difficult to answer the question as a matter of opinion, because, after all, facts are better than opinions, and we have the facts constantly before us. There has been one reason why the reductions have been from time to time very much pressed on the corporation of Manchester. We have at the other end of the railway the case of Liverpool, which is really in the hands of a company. The gas, I fancy, is about the same in quality, and the price is about the same; but there is no doubt that the price has been rather higher in Manchester than it was at Liverpool. That has been one of the arguments made use of by the consumers to get the price reduced at Manchester. The burners are regulated by the committee, but I cannot speak exactly with regard to that. In Manchester we have no parliamentary legislation or restriction of any kind with regard to the gas; but it seems to me a necessary consequence that, if Parliament fixes the price, they must fix the quality to be given for that price. We have no experience in the matter. We have simply powers, by an old Act of Parliament, to establish gas-works, and do the best we can with them. Of course the ratepayers do to a certain extent, control the corporation. The officer we employ has no directions with regard to the illuminating power, except to inform the committee at every meeting what it has been during the past fortnight, to satisfy them that the quality they expect is really obtained. There is no difference between the gas supplied outside the city and inside, except the 6d. per 1000 feet in price.

Cross-examined by Mr. HOPE SCOTT: Our gas has not varied considerably at different times. It has never been beyond 22 candles, and now it is 21·6. It has been a matter of contest between Liverpool and Manchester which should supply the best gas. A few years ago Liverpool sold gas at rather a lower price than we were charging, but at present the price is precisely the same. I think the price at Liverpool is 3s. 2d. If it is 3s. it is below us. I only speak to the best of my recollection. I cannot give a detailed comparison of the Liverpool and Manchester prices and qualities.

Mr. HOPE SCOTT: You gave this answer in 1866 to a question from Mr. Woods—"You stated that sometimes coal was used; I apprehend you would not think of producing a lower quality of gas than the present standard at Manchester if it could by any possibility be avoided?—No; the standard has been reduced from the positive necessity of using a considerable quantity of coal. The standard was always for years above 22 candles, and now it is about 21 candles; it has been reduced slightly, from the fact that we have been obliged to use a portion of coal, not being able to get all the cannel we required."

Witness: That was, I believe, quite consistent with the facts, although it was afterwards explained by Mr. Lancaster, who represents, I believe, one of the large cannel concerns at Wigan, that the difficulties did not arise so much from the want of cannel coal as from the fact that the corporation were not prepared with the means of bringing it to the gas-works. But there is no doubt, as far as this went, that that evidence was perfectly correct. We had allowed the usual stock of cannel in hand to go down to a very small amount, which was quite contrary to the usual practice, and the consequence was that there was a little difficuly in getting all the cannel required, and a little more coal than was thought desirable was used at the time; but we have now no difficulty in getting all the cannel coal that is requisite. I believe the quantities are the proportions which the committee designedly use in the manufacture, whether the difficulty in getting the cannel is greater or not. Of course, if the difficulty is great, the price might be increased; but the committee did not think it desirable, and they did not attempt to make gas of a higher illuminating power than 21 candles. They keep it as near that as possible, believing that that is the quality which it is desirable to distribute. The price of cannel has rather increased lately. I have heard it is nearer 17s. than 15s. now. I do not know the price in London in 1865, not what it is in London now, except from reading. I should not be surprised if it were 25s. The gas supply of Manchester has never been exposed to competition. They have therefore never been under obligation to lay down duplicate mains, and construct works for the supply of districts of which they were not sole masters. They have been able from the commencement to expend their capital in the most economial way possible. The profits, of course, were to be expended for the benefit of the whole of the ratepayers, and yet at the same time kept for the benefit of the gas consumers—the gas consumers being a very large proportion of the ratepayers.

Mr. HOPE SCOTT: There have been slight differences of opinion between the gas ratepayers and the corporation?

Witness: No doubt the gas ratepayers very often want to have their gas at cost price.

Mr. HOPE SCOTT: That is very wicked, evidently?

Witness: Of course, if they can get it, it is perfectly justifiable.

Mr. HOPE SCOTT: However, at Manchester you wish they may get it, I suppose?

Witness: No; we do not. In Manchester, seeing there is no competition, and that there never has been, the corporation consider that the gas consumers have a perfect right to have the gas supplied to them at as low a price as there is any reason to believe they could have obtained it for if we had unlimited competition; but, having secured the gas at that price, then the ratepayers to whom the works belong have a perfect right to apply the profits that may be obtained in any way that may be most advantageous to the whole body of ratepayers.

Mr. HOPE SCOTT: You have done something considerable in the way of the reduction of capital—that is to say, when I speak of capital, I mean the expenditure actually upon your works?

Witness: Yes. I believe the figures given in paragraph 3 of this paper are correct, though I have not had any opportunity of examining or testing them. There is only one figure here which I do not know how it is obtained. It may be a reasonable suggestion or not—"Add the working capital, which is at least £50,000." I do not think there is anything like that amount of working capital actually employed.

Mr. HOPE SCOTT: You have £818 3s. as the actual cost of the works?

Witness: Yes, as stated here, and I think it is correct. I have very little doubt this has been made out by a reference to the corporation accounts.

Mr. HOPE SCOTT: Do you agree with that statement—"A sum, therefore, of no less than £462,711 of the capital of £110,183 really invested in the concern has been provided out of the profits, and is receiving no return"?

Witness: Of course it is not; it is extinguished.

Mr. HOPE SCOTT: Do you admit this statement of the prices of gas at different times charged by you?

Witness: I have no doubt that will be correct. I almost think I put in a return myself in 1866 which went as far back, or nearly so, and I have no doubt that the statement is correct. The parties outside the township of Manchester might obtain their supply from other sources, no doubt, but they prefer coming to us. The Sheffield Railway Company have large works at Gorton, and they gave up their private gas-works and came to us. That shows the price, at any rate, was not thought to be unreasonable.

Mr. HOPE SCOTT: Surely, that merely proves that a small production is not equally as cheap as a large production. Now, have you turned your attention to No. 8—"Thus, in the case of Manchester, taking the volume of gas produced, as shown by the report of the corporation, at 1160 million feet, the profit required to pay the interest of 4 per cent. upon the reduced amount of £347,472 would be 2¾d. per 1000 feet. To pay a dividend of 10 per cent. (to which gas companies are entitled by the Gas-Works Clauses Act) on £810,183, a profit of 1s. 4¾d. per 1000 would be required, which is nearly the same as the rate required by the London companies. If the difference between the two rates of 2¾d. and 1s. 4¾.—viz., 1s. 2d.—were added to the present Manchester price of 3s. 2d. and 3s. 8d., it would make them respectively 4s. 4d. and 4s. 10d., which is no higher than the price charged in London." Have you been at the trouble of considering that statement?

Witness: No; I have simply read it. Of course, I have made no calculations. I see in that statement they certainly pay a compliment to Manchester, because they assume that we can borrow money, and have borrowed,

at the rate of 4 per cent. That certainly is, under recent circumstances, scarcely likely. I believe we borrow money upon very advantageous terms, but we have not, during the last two years, been enabled to do so. We cannot take that 4 per cent. as the uniform rate of interest that is to be paid upon the debt. Taking the whole debt of the corporation, the average has been very low; it has been very little over 4 per cent. We borrow for different departments, and sometimes upon different terms. It would be safer to take 4 per cent. We, of course, assume that we have a right to obtain 10 per cent. upon our capital.

By the COMMITTEE: That would include interest and 6 per cent. profit.

The CHAIRMAN: This is an argument contained in this document which may be good or may be bad, but which we shall be very glad to hear from you, if you should wish to put it before us.

Mr. HOPE SCOTT: I thought that it would be unfair that Mr. Heron should go from the box without being asked about this point.

Witness: Allow me to say, as far as this paragraph is concerned, that in Manchester we have to get 10 per cent. by the manufacture of our gas, just as a London company would have to get 10 per cent. upon their capital; the only difference being that in Manchester there is no subscribed capital, but merely borrowed money. Therefore there is 4 per cent. to be paid in the shape of interest, leaving 6 per cent., assuming we get about 10 per cent., which is what we fix as the rate we have a right to obtain, to be expended for Manchester.

By the COMMITTEE: That is what we aim at and get. We should reduce our price if it were shown by the accounts that we were getting more than 10 per cent. upon the capital which is being employed in carrying on the works, because the gas ratepayers expect to have their gas at as low a price as they would have if it were in the hands of a company, or even of competing companies; and inasmuch as 10 per cent. appears to be the maximum dividend allowed by Parliament, we fix that as the dividend, or rather the profit, which we have a reasonable right to obtain.

Mr. HOPE SCOTT: And a very sensible plan, Mr. Heron; but upon what capital?

Witness: Upon the capital I have already given you. Every year there is a valuation of the works made; that represents the capital upon which we expect 10 per cent. The surplus assets on the 24th of June, 1866, were £200,382, but in order to get that surplus assets they previously debited themselves with the mortgage debt of £347,472. Adding that mortgage debt to the surplus assets from which it had been previously deducted, makes the capital practically used for the manufacture of gas on that date £547,854.

By the COMMITTEE: The property is valued every year, in order to take off the depreciation; because, of course, the depreciation being taken off, that represents the property upon which the profit must be obtained. That includes the value of the land.

Mr. HOPE SCOTT: Let us have no mistake about this. Your 10 per cent. is calculated upon £547,000. This, last year, and the expenditure upon the works, has been £810,182?

Witness: I would rather it should be taken as I have given it.

Mr. HOPE SCOTT: Have you given the true result?

Witness: No; because in my answer already I have stated that that is the amount by adding the working capital. It would be fairer to take it at £600,000 than £550,000; but you may take it at £600,000 as the gross capital upon which we consider we may reasonably obtain our 10 per cent. That is writing off from the original a couple of hundred thousand pounds or more. Our gas-works are rated to all the rates to which private companies would be rated. Originally, by the Act of Parliament, they were exempt from the local rates; but when the corporation made arrangements to practically use the works as though they were the works of the whole corporation, although legally they were the works of the township only, then, as we had works established in our townships where they had to pay poor-rates and other rates, the corporation volunteered themselves to repeal the clause which exempted them from poor-rates in the township of Manchester, considering that it was fair that as they paid poor-rates in one township they should pay in all. That was not many years ago.

Cross-examined by Mr. REILLY: I really cannot say whether any of the increase of consumption has taken place among the poorer classes; but I consider the tendency of the reduction would be to such increase.

The CHAIRMAN: As far as that is an argument we can judge of that ourselves, but as far as it is a fact the witness does not know it.

Re-examined by Mr. WEBSTER: We take the sinking-fund, I am sorry to say, off the 10 per cent. The £52,000 odd is applied first in the payment of the interest on the debt; secondly, in providing a sinking-fund; and the balance only is available for improvements. Last year we only received about £20,000 for improvements.

By the COMMITTEE: The sinking-fund is applied at once, either in paying off a portion of the debt, which is its strictly legal application, or, if we were requiring further capital under the powers which we possess, and which we might borrow, we should apply that sinking-fund, very likely, instead of borrowing; so it would have the same result—it would reduce the debt by the amount. We do not keep any money in hand. As fast as we reduce the debt, either by the application of the sinking-fund or by the application of the depreciation-fund, we are, in fact, providing capital, whenever it is required, for rebuilding the works. The more we reduce our debt, the greater facilities we have obtained for providing capital.

Re-examination continued: Cannel coal was made the subject of inquiry in 1866. We have no difficulty in obtaining cannel coal at the present moment, but the price has certainly risen lately. There is a considerable supply from Wales, and I believe that has arisen from it being found more profitable to sell cannel than to distil oil from it, which was previously the practice. We also get some from Staffordshire. I believe the coal from which paraffin is made is closely allied to cannel.

Mr. *G. C. Cleminshaw*, examined by Mr. GROVE.

I am a consulting engineer, residing at Rugby. I was for 14 years consulting engineer of the Manchester Gas-Works. I have beside paid much attention to gas. I was examined before the select committee on the Corporation Gas Bill last year. I agree substantially with the evidence I gave on that occasion. I have considered the questions in the bill before the committee with regard to price and illuminating power. I am of opinion that gas of 18-candle illuminating power should, under proper arrangements, be supplied at 3s. 6d. per 1000 cubic feet, and a dividend of 10 per cent. obtained. I base that opinion upon the actual cost of manufacturing gas both at Liverpool and Manchester, and the relative charges which should be made in London. The actual price at Manchester is 3s. 2d. per 1000, subject to some deductions for large consumers; in Liverpool, 3s. The illuminating power is the same at both places—from 22 to 23 candles. The gas is made from cannel mixed with common coal. I have compared the cost of the production of gas in London with the cost at Liverpool and Manchester. The cost of cannel gas per 1000 feet in Manchester, according to the report presented to the corporation for the year 1855-56, was 10·116d. per 1000 feet for coal; and the cost of wages, purification, wear and tear, and loss of gas, was 11·950d.

By the CHAIRMAN: That includes leakage. For profit and other charges on capital, 1·934d., making up the charge of 3s. per 1000 feet. The charges in London, calculated from the returns presented last year to the committee, are as follows:—Cost per 1000 cubic feet on coals, 9·358d.; for wages, purification, wear and tear, and leakage, 24·356d.; for profit and other charges on capital, 14·286d., making up a charge of 4s. per 1000 cubic feet.

Examination continued: The difference appears to be in the expenses for wages, purification, and wear and tear. The fact I wish to point out more particularly with regard to the very great difference between those charges in Manchester and London is, that there is no sufficient reason for that difference. The management at Manchester cost 1·170d., in London 2·240d.; rents and taxes in Manchester 0·795d., in London, 1·110d. The difference in those items is very small. The rate of wages, I believe, is precisely the same in Manchester as in London, and this excess of cost in London cannot be attributed to the wages, and for this reason, that the labour in the retorts in Manchester is simply 3·282d., and in London it is 6·506d.; for wear and tear in Manchester 3·711d., in London 6·576. The point I wish to bear upon more particularly is this, that the large additional charge which I will call the excessive charge in London, is not to be attributed either to the coal or to the capital, or to the labour, but to the very large cost of distributing the gas, and to the very large leakage in the mains. The difference in the wages arises from the large cost connected with the distribution of gas. I consider that element of cost is one that may and ought to be reduced. I consider a proper distribution of mains would reduce the leakage of the gas. Since I came into this room I have cast my eye upon the map on the wall, and I think that that will partly explain what my meaning is. There seems to be a small district lighted by the Western Gas Company, and two detached districts lighted by the Chartered. It must be very apparent that the cost of supplying those detached districts, the cost of laying down the mains, and the length of mains, must be very much greater than if those districts were connected together; and the leakage also must be very much greater. The amount of leakage in London it is impossible to ascertain, because there is no statement of the companies which enables you to arrive correctly at the actual amount delivered into the mains; but I am of opinion that if those facts were stated by the companies, it would show very clearly and very distinctly what the real cause of the high price of gas in London is—viz., the large leakage in the mains, and the cost of keeping those mains in repair. The cause of this large leakage I attribute to the competition of former years. It has been stated, and I presume correctly, that there are 12 mains in Regent Street, 12 at Charing Cross, and there may be 3 or 4 in various other streets throughout the metropolis; and it must be evident that the leakage from those mains—the whole of which, at all events, are not now in use—must be very great indeed, and that the cost of keeping those mains and service-pipes in repair must also be very great; and that if a rearrangement of those mains were made, there would be a very large saving in each respect, and that would reduce the cost of those items which I have put down under the head of 24·356d. to the same rate as it now costs in Manchester. There appears to be no sufficent reason why the cost for wages, purification, wear and tear, and leakage should not be the same in London as it is in Manchester, with a proper attention to that particular point. I therefore assume that if those corrections were made the gas could be supplied by the metropolitan gas-works at 3s. per 1000 feet.

By the COMMITTEE: That is with profit, certainly. The carriage of the coal is the same.

Examination resumed: I calculate 12-candle gas for 3s., and that the company should make precisely the same profit as they are making now.

The CHAIRMAN: If we take your figures for coals and profit for London, and leave them untouched, and reduce your figures for wages to the Manchester level, that brings out the result to which you point?

Witness: Yes, it does. That would leave the coals in London 9·3d. per 1000 feet, whereas in Manchester it is 10·1d., arising from the large quantity of cannel coal consumed in Manchester. I am contemplating here 12-candle gas.

Mr. GROVE: What would be the increased expense in London, provided you were to change the 12-candle gas, which is the present illuminating power—or 13½, as we hear it is practically with an improved burner—into 18-candle gas?

Witness: I am coming to that point now. For the purpose of explaining this I will refer to the engineers estimate, sent to the Board of Trade, with the observations of the metropolitan gas companies, on the 21st of January, 1867. First I wish to point out that this estimate appears to me to be incorrect in three particulars—first, with reference to the charges made for fuel for the carbonization of the coal; secondly, with reference to the quantity of Newcastle coal required to produce 18-candle gas; and, thirdly, with reference to the price of Wigan coal and the price of Wigan coke. With reference to the charges for Newcastle coal, if you refer to the statement you will find that there are nine bushels of Newcastle coke credited in this account, the value of which is 2s. 3d., but the fuel to carbonize the coal is put down at 12 bushels at 3d., or 3s., which is simply impossible, because 2s. 3d. is credited, but 3s. is charged for fuel; so that a ton of coal only produces 2s. 3d. It is not possible to charge 3s. for that particular description of coke.

Mr. HOPE SCOTT: Are we talking about the same point? I see it is Newcastle coal one-fourth of a ton for producing gas, and 12 bushels of fuel, the nature of which is not stated?

Witness: If you will refer to the credit side, you will see 9 bushels at 3d., which is got out of Newcastle coal, but there is charged 12 bushels of Newcastle coal for carbonizing.

Mr. HOPE SCOTT: It is not mentioned what coal it is?

Witness: But there are 12 bushels charged at 3d. per bushel, and it must be Newcastle coal.

Mr. HOPE SCOTT: Could you go through each item consecutively, as then we could see clearly what you mean?

Witness: I will endeavour to make myself plain.

The CHAIRMAN: Would it be equally convenient for you, with a view to the clearness of your evidence, to begin, as is suggested to you, on the other side of the account, and go through it?

Witness: I will do so. I wish merely to point out the errors, and first of all to show the statement——

The CHAIRMAN: I am in the same difficulty as Mr. Hope Scott. I do not see the exact sequence myself, but if it is more clear to you to put it in the way in which you were going to put it, I think you had better do so. Do I correctly understand you to say that those two items, the one on the debtor side and the other on the creditor side, are to be taken in connexion with one another—viz., the 12 bushels at 3d., making 3s., and the 9 bushels at 3d., making 2s. 3d.?

Witness: I wish to show that it is impossible to use 12 bushels of coke at 3d., when there are only 9 to be used.

The CHAIRMAN: But then it is suggested on the other side that it doe not follow that the 12 bushels are to come from the same quantity?

Witness: But they must come from that quantity, because there is no other produced.

Examination continued: There is no other coke at that price produced, therefore it must come from this coal. The next point is this, that the Wigan coke is brought out for sale and charged at a very small rate (the inferior coke I will call it), whilst the best coke is used. That is a thing which no practical man would do. A practical man would use the inferior coke and sell the better class of coke. With regard to the mixture of cannel to produce 18-candle gas, three-quarters of a ton of cannel at 27s. a ton is charged, and one-quarter of a ton of Newcastle coal at 16s. a ton. One-half of Wigan cannel and one-half of Newcastle coal will produce 19½-candle gas. I base this estimate upon practical facts, having used in large quantities Lancashire coal of an inferior quality to the Newcastle coal, and have produced from a mixture of 19½ per cent. of common coal with Wigan cannel 23-candle gas; consequently, I estimate that half a ton of Wigan cannel and half a ton of Newcastle coal should produce 19½-candle gas. My estimate as to the cost of producing 18-candle gas is this:—Half a ton of Wigan cannel at 27s., 13s. 6d. I am following throughout the estimate which has been presented.

By the CHAIRMAN: I am now giving what I hold to be a more correct view of the same thing. Half a ton of Newcastle coal at 16s., 8s.; fuel, 12 bushels of Wigan coke, at 5s. per chaldron, 1s. 4d.; making together, £1 2s. 10d. On the credit side I put Wigan coke, 1s. 8d.; Newcastle coke, 4s. 6d.; tar, 1s. 5½d.; breeze, 2½d.; liquor, 1⅝d.; total, 7s. 11½d. The quantity of gas produced would be 10,200 cubic feet, costing 1s. 5½d. per 1000 cubic feet. The cost of making 12-candle gas, according to the companies estimate, is put down at 11½d.; and, in deducting the one from the other, the actual excess of cost in London of producing 19½-candle gas is 6½d. I have shown that the extra cost in London is 1s. per 1000 feet, and that if this arrangement alluded to with reference to the mains were made, it could be reduced to 3s. per 1000 for 12-candle gas; and consequently that 18-candle gas (which I put down at 19½-candle gas nominally, but I will call it 18-candle gas) should be supplied at 3s. 6d. per 1000 cubic feet, the profit remaining precisely what it is now. With regard to the waste in the distribution, two or three years would probably be required to make the changes requisite to remedy it.

Cross-examined by Mr. HOPE SCOTT: I do not think it would cost anything to make the change, because the useless mains that are taken up and the saving that would be effected by those alterations would absolutely pay the cost. In many cases there may be three or four mains in a street belonging to the same or different companies, but under the system of districting I do not see how there can be mains of different companies in one district. I have my theory upon the fact that there are in existence a very large number of mains throughout the metropolis that are useless, and hence it is that the leakage is so large. There is no other way of accounting for the immense leakage. If I had to put it in an Act of Parliament I should word it so that the mains should be taken up. I believe that was not done when the districting was made, and that the mains still lie in the streets. No doubt those that are passably useful are used.

Mr. HOPE SCOTT: You do not mean that any company having duplicate mains, one of which is useless, puts gas into that useless main?

Witness: Mains under such circumstances would be partly used, and in some cases, no doubt, it would be convenient to use them. For example, I take the statements of the companies, and they say there are twelve mains in Regent Street, whereas two would be sufficient. I cannot say who they belong to, excepting that I see in whose district they are. Under the system of districting they must be in the hands of one company.

Mr. HOPE SCOTT: Do you mean to say that one company is keeping up twelve mains in Regent Street where two would do?

Witness: I did not mean to say so. I mean that the company might keep up three or four mains for the purposes required, instead of their ten or twelve.

Mr. HOPE SCOTT: I am sorry to say I do not now understand you. It seems that the case you put forward is this, that Regent Street is exclusively in the district of one company, which has twelve mains in that street, whereas two would be sufficient. Is that so?

Witness: Yes, it is so. That was owing to the competition of former years, and other companies coming in there.

Mr. HOPE SCOTT: Your course would simply be to call upon the company which supplies Regent Street to take up those useless mains. I am told there happened to be two companies down the middle of the street.

Witness: There it shows the question still more strongly, because if there are two companies supplying Regent Street with gas, where only one would be sufficient, it is perfectly clear that the mains are twice what is needed for the district, and that the leakage must be twice what it should be.

Mr. HOPE SCOTT: Therefore does it not tend to this, that there ought to be a fusion of the companies, so that at the limits of the districting there should not be that duplication of work which must be incidental to the division between the territory of the two?

Witness: Precisely so. I do not wish to carry it so far as a fusion of all the companies, but I think a fusion of the companies would be very necessary and very desirable to reduce the cost of gas, and in other respects also; as, for instance, in the reduction of the various charges. The mains of one large company would be more conveniently laid than the mains of three companies. Competition has done a very great deal of harm, and has raised the price of gas to its present price. Parliament sanctioned competition, and the consequences are now being felt by the public.

Mr. HOPE SCOTT: Of course, I suppose (you speak in a very moderate manner upon all these matters) that the remedy, whatever it is, ought not to be at the cost of the companies, who have invested their money *bonâ fide* upon the encouragement to competition given by Parliament?

Witness: I do not quite understand what you mean by the cost of the company.

Mr. HOPE SCOTT: Whatever remedy it may be necessary to apply, in order to do away with the injurious effect of Parliament having encouraged competition, should it not be at the cost of the shareholders of the company, but at somebody else's cost, whoever that may be?

Witness: But I think, too——

Mr. HOPE SCOTT: Will you answer the question?

Witness: I will answer it if you will allow me.

The CHAIRMAN: Mr. Cleminshaw has come here to give us his opinion practically as to what can be done and what the figures are, but as to the mode in which the remedy is to be carried into effect, he rather leaves that to the committee than takes it to himself.

Mr. HOPE SCOTT: Yes, sir; but if you will be good enough to remember, the condition of Mr. Cleminshaw's calculations is, that those arrangements should be made; that is the stepping-stone.

Witness: It is the stepping-stone to the real end.

The CHAIRMAN: The alteration, the witness says, might be made without costs.

Mr. HOPE SCOTT: The alteration in some cases might be easy enough; but the alteration in the sense of taking up the whole of the mains of one company in Regent Street, and leaving only one company with mains, these evidently could not be done in so simple a manner.

Witness: I think it could, and for this reason, that the value of a main is greater than the cost of taking it up.

Mr. HOPE SCOTT: I do not know whether I am transgressing any rule of the committee in the course of my examination.

The CHAIRMAN: Not at all; only the committee feel unanimously as I do, that anything in the nature of argument, we should be very glad to hear from yourself, but we shall not attach the least more weight to the argument because it comes through the witness; if it is a matter of fact about which he knows anything, we shall be most glad to hear it.

Mr. HOPE SCOTT: I must test the value of the witness's evidence, by seeing whether he can carry out his opinion logically. It is the opinion of this gentleman that leakage is a great cause of expense and labour in London.

The CHAIRMAN: It is the unanimous opinion of the committee that the particular question which you were putting to the witness, and which he declined to answer, he very reasonably declined to answer.

Mr. HOPE SCOTT: Then I will presume it as a question of fact, more or less, however, connected with this witness's opinion. (To witness:) You have taken your average, have you not, of all the expenses in London as the average of all the companies expenses?

Witness: I have taken the average of coal, and in the average of coal I have excluded the Chartered and the Western Companies, because they are, either wholly or partially, cannel coal. I have taken the average of labour from thirteen companies, and the average of everything else, with the exception of capital, and in this I have excluded three companies—the Western, because it is out of the district, and supplies Wigan cannel gas; the Equitable, because their charges are very large; and the Phœnix, because that is also large; and I have considered that it is fairer to take the general average of the ten companies than it would be to include those three. Upon capital I include all the charges—the charges for dividend and interest. Those charges are included in the 14·286d.

Mr. HOPE SCOTT: Are you aware that with regard to the productive power of cannel, Mr. Hughes told the committee that "there is a great deal of mixed coal in Lancashire, and that there is a great deal of cannel coal that will not make the best gas. There are only one or two seams that will make far higher than 18-candle gas"? Do you agree with him about the general characteristic of cannel coal so given?

Witness: The Wigan coal will produce the richest quality of gas. There is really only one small seam that will produce inferior gas. I have taken the Wigan cannel as an example to base my estimate upon, simply because it has been so taken by the companies. The error in this table of the calculation of the cost of 18-candle gas arises, in the first instance, from a greater proportion of the costly to the cheap material being taken. I do not know the proportions in the Manchester gas personally, but I heard Mr. Heron say the proportion of coal was 33 per cent., and I think that proves that the proportion I have taken of Newcastle coal is fair and reasonable.

Mr. HOPE SCOTT: You think that the comparison between the gas at Manchester, which is as two to one of cannel to Newcastle coal for 21 candles, supports your proposition, that half-and-half would make, as I think you said, 19½-candle gas?

Witness: Nominally 19½, but I will take it as 18 to the consumer. That is the result of my experience on a large scale. The trials I made were upon 8000 or 10,000 tons of coal at the Manchester Gas-Works, over a period of some two or three months in the ordinary course of working. That was some eight or nine years since. The cost of cannel at that time was about 14s. per ton. We used in the proportion of 19½ per cent. of ordinary coal to produce 23-candle gas. Before then we used Wigan cannel entirely, and had been giving gas of 25 or 26 candles. By "fus to carbonize"—in this account 12 bushels at 3d.—I understand that to mean best coke. It will be seen that Wigan coke is only charged 5s. per chaldron, and I consider that is much too low, as the value of Wigan coke is really as great as Newcastle coke—that is for heating purposes.

By the COMMITTEE: I mean for our own use, but it is not so marketable as Newcastle coke.

Cross-examination resumed: In comparing the 12 and 18 candle gas, I have followed as exactly as possible the companies statement. Their estimate of the cost of making 18-candle gas, and using Newcastle coke at 9s. per chaldron, I consider to be wrong. They ought to use the Wigan coke, which they put down at 5s. per chaldron. In making 12-candle gas, I do not think they could carbonize at a cheaper rate than they do at present. I think the cost they put down for gas, 11½d., is rather excessive. If the charges for coal are 16s. per ton, the fuel for carbonizing is a fair rate for fuel, and the products on the other side are fair.

Mr. HOPE SCOTT: Then in what they are really doing at this moment as regards the tabular statement in these particulars, you do not quarrel with the proceedings of the company.

Witness: I am not prepared to answer that question, because I take this simply as a matter of fact, and it is sufficient for me to form the statement I have upon this statement.

Mr. HOPE SCOTT: But you see there are two questions here—one, whether the companies are now producing with economy and the use of all reasonable means; and another, whether with the same reference to economy and also all reasonable means, they would be able to produce 18-candle gas at another figure. To go from the starting point, which is one of expense, I ask you whether you are prepared to attack any one item in the actual table with regard to the 12-candle gas? The other is a speculative table, of course?

Witness: Of course it is. I do not see which I can attack, and which approve of. Coal is taken at 16s. per ton, and it is a simple estimate—it is not what it costs them. The fuel also is taken at 3d., which is also a statement, and I do not think that your question bears at all upon this statement, because it is a mere statement. If you ask me whether the cost of gas, which I have put down at 9½d. is correct, I should say it was fair and reasonable. It is possible it might be improved. The 11½d. given by the companies is simply an estimate, based on the cost of coal being 16s. On the other hand, the 9½d. is the result of a year's working. Taking the companies statement for 1864 presented to the committee last year as a basis, I should say that 18-candle gas should be made at about 15½d. per 1000 cubic feet, but if the price of coal has slightly advanced since then, it would cost something more than that. In taking 3s. 6d. as the price per 1000 feet, I have based my estimate on the returns for 1864. The return for 1865 was not within my reach. In comparing the Manchester prices with the London prices I took the returns for 1865. If the cost of distribution is properly regulated, the companies could supply 18-candle gas at 3s. 6d., and make

the same dividend as they do now. There is a question of 6d. per 1000 feet difference, which arises from the leakage, and the wear and tear attendant upon that leakage.

The CHAIRMAN: If the 6d. calculation as I have taken it is this (and I mention it that there may be no mistake about it), the witness gives various figures which for Manchester make 3s. for the cost, and then he gives the corresponding figures which for London make 4s., and he says that if the item of wages, which at Manchester is 11·9d. and in London 24·3d., were brought to a level, the payment of dividends on the profit might be the same as it is now in London—viz., 14·2d.; but then, in that calculation, Manchester is giving 21-candle power, and London only 12-candle power, and therefore, in order to raise London up to 18-candle power, he goes through a subsidiary calculation, and he estimates the cost of the fuel for making the 18-candle power in London at 1s. 5½d., and from that he strikes off the 11½d. which in this estimate is charged for the London 12-candle power, and that leaving a difference of 6¼d., raises his estimate from the Manchester 3s. to 3s. 6¼d.

Witness: Precisely so.

Mr. HOPE SCOTT: I want to know what effect upon that calculation the question of leakage has?

The CHAIRMAN: It does not touch the 6d. The leakage depends upon the difference between the 3s. and the 4s. The leakage will not be increased by 6d., because it is 18-candle gas instead of 12. It is another part of the calculation to which the leakage applies.

By Mr. HOPE SCOTT: I estimate the labour and the loss of gas at 1s. per 1000 feet. The Manchester leakage is very small indeed.

Cross-examined by Mr. MICHAEL: I assume the gas would really be 13-candle gas, in order to obtain 12-candle gas for the consumer. The illuminating power from Wigan cannel is 26 candles. From the mixture of half coal and half cannel I get 10,200 feet. I have got 10,398 feet. From 300,000 to 400,000 tons of cannel would be required in London. That is taking a mixture of cannel. I do not think it would be necessary to use entirely Wigan cannel, but other descriptions which might be cheaper. Cannel is to be obtained in any quantity from Scotland, but I cannot tell the price. It could be obtained from Wales and Staffordshire. The cannel-field is developing in Staffordshire and Yorkshire. If the price of Scotch cannel were 60s. a ton, I do not think a gas company would use it.

Mr. MICHAEL: The last quotation for Boghead is 50s. a ton; would that be available to carry out your calculation of 18-candle gas?

Witness: It is a difficult question to answer, and would render necessary fresh investigations. The Boghead cannel is a very different material indeed from the Wigan cannel.

The CHAIRMAN: The witness has taken for his estimate the same estimate that is put in before us on this point—viz., 27s. per ton—and he has only estimated one-half to be cannel, whereas in this estimate three-fourths are taken.

Mr. MICHAEL: You will see that is upon the assumption of the present price.

The CHAIRMAN: He has made his calculation upon an assumption more favourable than that which is contained in this paper, inasmuch as he has taken the same price, and has only allowed one-half the quantity, while in this paper three-fourths of the quantity are allowed.

Mr. MICHAEL: I wish the committee to have some information as to the quantity of cannel at present available at the present price, and what the consequence would be of a very largely increasing demand.

The CHAIRMAN: I only wish to point out that this statement put in on the other side is more favourable to his calculation than his own statement is.

Mr. MICHAEL: You will see by one of the memoranda which has been referred to the committee on this subject, that the companies very carefully qualify their statement by mentioning the present price, 27s.

The CHAIRMAN: I am very unwilling to stop the cross-examination, because you have a perfect right to test thoroughly the evidence which is put in before us; but we cannot go into a collateral inquiry as to the possible exhaustion of different kinds of coal, and I think that when the witness has taken the actual price from this evidence, and has allowed a smaller proportion of cannel than is taken in his estimate, it is not reasonable to endeavour to push him by asking him what may be the future price of cannel at some remote period of time.

Mr. MICHAEL: If the committee will allow me, I venture to ask your attention to the 13th paragraph of Memorandum No. 1, where you will find that the companies, when they put down 27s. as the present price, very carefully qualify it by saying, "The above calculation is made upon the assumption that the increased quantity of cannel that will be required will be procurable, and at the price now being paid by the companies—viz., 27s. per ton." This, however, cannot be expected, and it is merely to have a calculation and a good datum before the committee that could absolutely be proven. The 27s. is put in so as to have some definite datum, but it must not be taken that the companies acknowledge that 27s. will be the future price.

Witness: May I be allowed to state that I have taken 27s. per ton as the price of Wigan cannel because the companies have taken that price; but I believe that it could be got at the present time at 25s. a ton. All the cannel must be 25-candle gas power to carry out my idea. I believe that if the companies were to go into the market now for cannel, they would get all they required at 25s. per ton, if they contracted for a term of years.

Re-examined by Mr. GROVE: It is doubtful whether the Boghead cannel is a coal at all. I have taken the returns for 1864 simply because it is the paper which was presented before the committee who sat last year, and I have no means of getting any other paper for the purpose of this calculation. There are 15 bushels of Wigan coke produced to 9 of Newcastle coke, and if they use 12 bushels of coke they have no right to use 12 bushels of Newcastle coke, which costs 3d. a bushel, when they only produce 9, but they should rather use the 12 bushels of Wigan coke, which is produced at a cheaper rate. With regard to the question of districting, the City of London is at present supplied by three companies, and surely it would be cheaper and better to have only one. I saw the map introduced by the gas companies last year. It did not show the superfluous mains.

Mr. *John Romans*, examined by Mr. SARGOOD.

I have had considerable experience with regard to Scotch cannel. I am a cannel coal merchant, taking an interest in vending in England the Marquis of Lothian's cannel. We have no ground for fearing there would be an inadequate supply for any larger demand.

The CHAIRMAN: We cannot go into that.

Examination continued: I have had some experience as a gas manufacturer. The Marquis of Lothian's cannel is 33·8 candles, and 12,500 feet to the ton. That is a very high power. I made a calculation last year at what price gas manufactured from that coal could be sold per 1000 cubic feet, so as to return a fair remunerative profit on the capital necessary; but the price has gone up 3s. 6d. per ton since then. It is now 38s. 6d. The corporation were then trying to obtain power to make gas themselves. My impression then was that it could be done at 3s. I do not say the present companies could do that. In that calculation the price of Newcastle coal was taken at 13s.; but I find from an article in the JOURNAL OF GAS LIGHTING that the London engineers say the price is now 3s. more, and I have such an opinion of the names appended to the report that I do not believe those gentlemen would put in what was not correct. Taking these things into consideration, I dare say gas might be sold at 3s. 6d. per 1000, but I question if they would pay 10 per cent. at that rate on their present capitals.

Mr. *J. E. Clift*, examined by Mr. WEBSTER.

I have had many years experience in the manufacture of gas; for many years with the Birmingham and Staffordshire Gas Company, and for the last eight or nine years consulting generally. I am also proprietor of works at Redditch, about 12 miles from Birmingham. My attention has been a good deal called to the manufacture of gas, and the different proposals with regard to the City of London. The site proposed last year was North Woolwich, which had many advantages. The advantage, as far as coal was concerned, was from 1s. 6d. to 2s. per ton. It was also advantageous with reference to the disposal of the products, such as a ready market for coke, tar, and ammoniacal liquor. I make my gas at Redditch from Derbyshire coal entirely, which gives an illuminating power of about 14 candles. I based my calculations last year on 3/10ths Scotch cannel, giving 33 candles, and 7/10ths Newcastle, giving 12 candles; the average of the two giving 18 candles. The Scotch cannel I estimated at 12,000 cubic feet per ton, and the Newcastle at 9200 feet. Worked out at the prices which I have obtained, and which were verified at the time, the cost of the manufacture of gas was 28·22d.; the cost of purifying, 0·48 of a penny; supervision and labour in the manufacture, 6d. per 1000 feet; wear and tear of retorts, plant, tools, mains, and services, 2·40d.; repairing and restoring meters, which I estimated at 7½ per cent., 0·72d.; cost of distribution, including secretary, clerks, and collectors, bad debts, stationery, auditors, chemists, rents, rates, and taxes, 2·88d.; reserve and contingent funds, 1 per cent.; interest on capital, 5 per cent.; and redemption-fund, 1 per cent.; giving 6 per cent. That was on the debit side. On the credit side I put the sale of 1000 million cubic feet of gas at 3s.; coke for sale, after deducting 20 per cent. for fuel, at 9s. per chaldron, 10·36d.; tar, 1·44d.; ammoniacal liquor, 0·94d.; and that brings the gas out at 3s. per 1000 cubic feet. That is allowing 5 per cent. upon the capital of the company. The object of this calculation last year was to show that the manufacture of gas for the corporation of London, when they did not require a dividend, would pay an interest of 5 per cent.

By the CHAIRMAN: Those are London prices.

Examination resumed: The plans I prepared were similar to the ordinary plans of gas-works; there was nothing novel about them, and they were drawn to adapt themselves to the situation we had to work in. That included nothing for meter-rent, as the meters were to be free. The gas was to be of 18 candles illuminating power, and of the purity prescribed as regards sulphur, and the other conditions. There is nothing to alter this estimate, except the report which I hear that the price of coal has advanced since last year, but of which I know nothing from my own knowledge. I think gas could now be manufactured at that price, taking the cost of coals which I have given.

Cross-examined by Mr. RICHARDS: In my experience the cost of coal does not materially affect the price of gas. It makes a little difference. My calculations are based on 35s. for Scotch cannel, and 13s. 3d. for Newcastle coal. I have not had time to correct my estimate. I should not correct my estimate unless I had prices which I knew were quite correct. I am aware that the price of coal is on the rise, and also wages and labour. The Newcastle coal I put down at 13s. 3d. was the Pelaw Main. The coal was to be delivered at North Woolwich at that price. It is nearer the mouth of the Thames than the London Gas-Works. I can tell you the cost of the mains to convey the gas from that site to London. I am speaking of the supply to the City, which I am aware is only a small portion of the metropolis. I cannot tell the quantity of gas supplied to the metropolis. The quantity I calculated upon last year was 1200 million cubic feet. I know there are two companies alone which supply about double that quantity in a year. If I were asked to design works for the whole of London I should not place them all at North Woolwich, but round London certainly. The north side of London would be favourable for gas-works. I designed works for the parish of Marylebone on the north side, but the committee did not pass the bill. That was in 1854, and I merely mention it to show I should not fix upon that site alone for the supply of the north and south of London. I would not fix upon any site my clients suggested. At Redditch I pay 13s. 6d. for coal, and charge 5s. and 5s. 6d. for gas. The coal varies in quality; we do not always get the same sort. The Redditch people do not complain that they do not get 12-candle gas. The price at Redditch is quite as low in proportion as the price in London, considering it is a small work, only producing about 12 million cubic feet of gas a year, whereas the City of London, which is represented as a very small portion of London, take 1200 millions a year. If 18-candle gas is to be supplied under penalties, it would not be safe to make it exactly 18; but I do not think it is necessary to make it 19½ candles. I never heard of 10,000 feet of 15-candle gas being made from a ton of any Newcastle coal. It is not in any experience possible to do it. There is necessarily a certain proportion of loss in the course of manufacture, drawing the retorts, and so on. I consider 9500 feet as a reasonable quantity of from 12 to 13-candle gas. My estimate last year was 9200 feet. My experience is at the Great Central Gas-Works. That is the quantity which we produced over a considerable extent of working from Newcastle coal, and it was 12 candles illuminating power, tested by Dr. Letheby at that period, but that was with the old burner. The burner now in use would give 13½ candles. The Great Central Company started in opposition to the existing companies ten or twelve years or more ago, to supply gas at 4s. per 1000 feet. The concern was leased, and I was engineer to the lessees, Messrs. Prior. I do not know what dividends they paid in my time. I was not a shareholder, and therefore had no interest in knowing. After the passing of the Metropolis Gas Act in 1860 they raised their price to 4s. 6d. I do not know that shortly before that rise they were only paying 3 or 4 per cent. I remember an inquiry into the state in which Messrs. Prior left the works; but they were left in a far better state than when Messrs. Prior took them.

Re-examined by Mr. WEBSTER: After the Act of 1860 the gas companies generally throughout London raised the price to 4s. 6d. It is a matter of fact that by one kind of burner a higher illuminating power is obtained than by another. The burner now in use gives an illuminating power of 1½ candle more than the old one. There are other sites in different parts of London, which, if not equally favourable to the North Woolwich site, would be more favourable than the sites at present occupied. If they did not have river accommodation they would have railway accommodation, by which they could get rid of the residual products, and have the advantage

of getting coal into their works without the haulage and lighterage they have now. The price of coal rises and falls, and it is the rise of the residual products at the same time that made me say that the price of coal did not affect so materially the cost of gas. There is a considerable difference in the cost of the manufacture of gas at different places, and the value of the residual products at those places is a material element in the cost of the manufacture.

By the COMMITTEE: The cost of the mains for bringing 1200 million cubic feet of gas from the site at North Woolwich into the City would be £103,064.

Mr. *Jas. Beal*, examined by Mr. WEBSTER.

I carry on business at Piccadilly, and have taken some interest in the gas question for many years. I was honorary secretary to all the vestries of the metropolis engaged in the gas inquiry from 1858 to the passing of the Act in 1860. I have also acted since the formation of the body of delegates last year, in their communications with the Government in reference to this bill. The Act of 1860 fell short of our expectations as regards illuminating power and price.

Mr. WEBSTER: What is your opinion of the operation of that Act as regards the requirements of the metropolis?

Witness: I should say, in reference to that, that as far as the companies are concerned, I believe they endeavoured honestly to carry out the provisions of that Act; but the vestries have altogether failed to carry out any one of the duties which the Act imposed on them. The appointment of chemical examiners by the vestries has fallen almost into disuse. In our own vestry a chemical examiner, Dr. Lankaster, was ordered to report, but when the period came for the money to purchase the apparatus, we failed in obtaining the requisite sum. In other vestries where a chemical analyst was appointed, he was generally merely a medical officer, having no special qualifications for the duties imposed upon him. The vestries had power, under the Metropolis Gas Act, of using certain powers contained in the Gas-Works Clauses Act of 1847, to inquire into the capital of several companies, to enter into an analysis of their accounts. On no single occasion have those powers been enforced by the vestries, and our representations, therefore, to the Government was that, whilst believing that the companies have not given us the full benefit which the Act entitles us to, the want of action on the part of the public proceeded from the inaction of the vestries against the gas companies, we, therefore, were anxious that the Government should arm some stronger and greater municipal power with the requisite authority to deal with those great companies. Therefore we asked them on the one hand not to interfere with the City of London, who are perfectly well able to take care of themselves in their agitation, and, on the other hand, we wish that the Metropolitan Board should be clothed with full authority to prescribe certain regulations under which the companies should act, with power to examine into their accounts, as was the case with the water companies in 1852—a most important question, and possibly the most important which could receive the attention of this committee, for the result of the inquiry in 1852 was to cause such a rearrangement of their accounts that the capital of the West Middlesex Water Company was reduced, by investigation, from £830,000 to £506,000, the Chelsea Water Company from £428,243 to £300,000, the Grand Junction Company from £523,735 to £354,000, and the Southwark and Vauxhall Company from £439,662 to £303,600. We felt that that was so important that in our disjointed and peculiar mode of government in London, only a power either supported by the Government, or moved by so great a corporation as the Metropolitan Board, would adequately deal with it. Then we felt that if the companies objected to this, as the supply of gas was in Manchester a matter of municipal action, we were entitled to look upon it in London precisely in the same way, that powers should be given to the Metropolitan Board to arrange terms with the several companies, and take the supply into their own hands. That was the basis of our present application to Parliament, and upon which this agitation has proceeded.

Mr. WEBSTER: As a matter of fact, so far as regards the Act of 1860, you have not obtained the illuminating power, or the means of enforcing it?

Witness: We have no means of saying we have not obtained the illuminating power by the reports of men appointed to examine. So deficient has been the analysis that we are not justified in publicly charging the companies, because we have no evidence to prove it to be the case. Therefore it is the old complaint of all the gas consumers, which was carried on, on renewing the consideration of this question, that their gas supply was deficient; that the old burners had to be changed, and that with the change they still did not get the illuminating power which they required, and they threw the blame of it on our gas companies.

Examination continued: I am well acquainted with the special Act of 1860. That Act came out of the committee very different in form from what it went in. It left the committee right enough at one stage, but, having gone down to the House of Commons, the bill was recommitted, and the change was so great that we did not know the bill again; and if our position had been different, if we could have thrown up the agitation without personally, as delegates, being liable for the whole cost of the inquiry, we should have thrown it up. That bill did not give us the protection we thought we required. The committee had reported, if I remember rightly, in favour of an 8 per cent. dividend, and in favour of a graduated scale of prices, which, I believe, would have been just to the companies and a great benefit to the consumers. But afterwards, in the House, that was altered to 4s. 6d. per 1000, which they were then charging, and to the 10 per cent. dividend, which they could only obtain by the Gas-Works Clauses Act under competition, and which they were guaranteed under a monopoly; but it gave us no power of obtaining corresponding advantages, for the companies could earn 10 per cent. or they could earn 14 per cent., and we had no guarantee that the 4 per cent., plus the 10, would be devoted to the benefit of the public. They could squander it in the enlargement of their works, in the increase of salaries, and in extravagant expenditure, and we had no means of checking it or deriving the benefit which we were entitled to. The Metropolitan Board was ultimately authorized to pay the expenses of the Act, and charge it *pro ratâ* upon the metropolis. Having reference to the numerous complaints that have been made, I think if the difference between common gas and cannel gas is got rid of, and we have one simple and uniform standard of 18 candles at a fair price, that would be the best thing we could have in the metropolis. In giving that view, I represent delegates from the Strand District Board of Works; the parishes of Hackney; St. Martin in the Fields; St. George, Hanover Square; St. Pancras; St. Saviour's District Board of Works; Chelsea; the Wandsworth District Board of Works; Islington; Bermondsey; the Westminster District Board of Works; St. James, Westminster; St. Giles's District Board of Works; St. Marylebone; the Holborn District Board of Works; Lambeth; and St. Mary, Rotherhithe. By the "districting" at present I understand the metropolis being allocated to certain gas companies with a monopoly, and no protection in the interest of the consumers. I am aware that a much higher standard than 18 candles exists in other places. As regards price, the City of London offer to supply constituents at 3s. 6d. per 1000, and the Metropolitan Board have offered to supply London at the same price, and, with those two advantages offered us, I do not think we ought to mention any lower price. They have done so under good advice, and with that advice we are satisfied.

Mr. WEBSTER: You are a little mistaken, I think. The price which the City of London offered to supply gas for last year was 3s.

Witness: Yes; and the Metropolitan Board of Works 3s. There has never been any adjustment of the capital accounts of the gas companies. That is a matter we urged very strongly upon the Government. Attention being directed to the capitals of the several companies, it would be found that, whilst one sum per 1000 feet would earn 10 per cent. dividend upon the capital of one company, it would hardly earn 5 per cent. upon the capital of another. We felt, therefore, that what was done with the water companies in 1852 should be done with the gas companies now—that is, that they should become virtually one company, or should be treated as such; and we asked the Government to go further, and to agree, if we cannot get one general management with the Metropolitan Board of Works, to force an amalgamation between the several companies in the interest of the public, so as to get rid of the enormous cost of management and the charges which we see in the accounts, owing, to a very large extent, to the costly management of these companies. The conditions of the companies as regards capital are very different. The conditions as regards cost of manufacture I know nothing of. If justice is to be done it is essential that there should be something analogous to what took place in reference to the water companies. By clause 48 of the bill of 1860, 8 per cent. was put in as a dividend. I think something in the nature of a Chemical Board, or some stringent measures of that sort, must be adopted for the protection of the public. I have been interested in the supply of the public lights. The Act of 1860 had an arbitration clause in the event of the parishes and the companies not agreeing about the price, but some of the parishes are so small that many object to litigation. The Act throws the costs of the litigation upon the losing party, and it was a very expensive inquiry—as expensive as an inquiry here—and consequently that clause has been inoperative. In our case, in St. James's, the Western Gas Company are supplying us at £3 13s. 6d. a lamp, and the Chartered at £3 15s. 6d. They make no contract with us—they simply write us a letter that that is their price. We are supposed to receive 2½ feet per hour, but I believe, if we had a proper burner 1½ foot would be ample for our requirements; and the price should be, including cleaning, £2 16s., instead of £3 15s. 6d., which was the alternative that we had given to us when we were arranging with the gas company for the supply of our public lamps. We want an arbitration clause of a simpler kind than in the Act of 1860.

Cross-examined by Mr. DENISON: I should imagine a witness giving evidence before the committee last year first suggested a Chemical Board.

Mr. DENISON: Do you not know that we ourselves offered it last year, and the committee in making their report accepted our offer?

Witness: I do not know who suggested it. I have not read the proceedings of last year. I know the companies have expressed their readiness to substitute the Metropolitan Board for the vestries; so, as regards that part of the case, we have no grievance. The companies have endeavoured, as honestly as they can, to carry out the Act. When the companies reduced the price 6d. per 1000, I believe, if an inquiry had taken place into the accounts of the several companies presented to Parliament by an authorized public board, the reduction would have been 1s. per 1000 feet.

Mr. DENISON: Then you mean we were about half as honest as we ought to have been. You say, if our accounts had been properly examined. I think, if I remember rightly, there was some discussion in 1860 about the form in which the accounts should be made up, and we assented to anything the committee desired in that respect?

Witness: Yes, in the form of accounts. A form of account was prepared by myself, which is now used by the companies.

Mr. DENISON: In 1860 you say the bill was so altered on recommittal that you hardly knew it?

Witness: Yes.

Mr. DENISON: It is rather metaphorical, because you and Mr. Wyatt were present the whole time when they were dealing with the alterations.

Witness: We were, after the counsel had left the room on the part of the gas companies till the close of the first report of the committee; but after it came down again, if I remember rightly, you attended.

Mr. DENISON: No, indeed. You told me I need not—that you thought you could do it better.

Witness: I beg your pardon. We had counsel here; but Mr. Baxter, having allowed the counsel to retire from the room, took up the case, and in about two hours undid the whole of our 21 days work in the committee of the House of Commons.

Mr. DENISON: Do not you remember that you and Mr. Wyatt together told your counsel that they need not be present in that discussion?

Witness: I do not remember it. I know this, that counsel left the room, and Mr. Baxter made that great speech—certainly one of the greatest speeches I have heard.

Mr. DENISON: Modesty is a very amiable quality, but still the fact is that you were present during the discussion on the recommittal of the bill.

Witness: I may have been, but I do not remember it to the extent you put it. The alteration made was this, that our graduated scale was gone, and the price of 4s. 6d. put as a fixed mean; our 8 per cent. was gone, and 10 per cent. put in. These two alterations alone made the change so great that the bill was unworthy of our acceptance. Notwithstanding that I circulated a letter requesting the persons who were interested in it not to abandon the bill, but to go on with it in the House of Lords as a valuable bill against the companies.

The CHAIRMAN: I am very unwilling to stop the cross-examination, because I wish to give full latitude to the proper testing of the witness, but as I understand at the present moment the question merely turns upon how it happened that the bill of 1860 was accepted in the form in which it ultimately passed by those who promoted it in its original shape. The witness told us, in his examination in chief, that one principal consideration was that it would have been a very heavy charge for costs if that course had not been taken, and that influenced him very much; and upon that, as I understand it, this cross-examination is taking place.

Mr. DENISON: I want to show that there was a very much more important consideration.

Mr. WEBSTER: With regard to the letter, I quite agree with the chairman that the cross-examination is very essential, but his explanation is equally essential, and it is very convenient, if a witness has the capacity to do it, that he should do it at the time, rather than that I should have to do it afterwards.

The CHAIRMAN: What I understand is, that Mr. Denison wishes to show that they were better pleased with the arrangements at that time than appears to be the case now.

Mr. DENISON: That is exactly what I want.

Cross-examination continued: There were some substantial advantages to the consumers which justified our going to the committee of the House of Lords. The parish of St. Mark, Lambeth, started up in the House of Lords as opponents of the bill. I acted for the majority of the delegates, and was backed by them, and, therefore, could not notice the opposition of Lambeth. We did all we could to prevent the Lambeth opposition going on and producing any point. The question was raised in the House of Lords whether there had not been a complete agreement about the bill between the promoters and the gas companies after the recommittal and before the third reading in the House of Commons, and Mr. Baxter and Mr. Wyatt were examined upon that point, and a serious divergence of opinion was apparent between them. The House of Lords determined that everything that had been so settled by that agreement should not be re-opened. I should prefer the graduated scale, as in the bill when introduced by Sir Stafford Northcote to the suggestion now made, by way of compromise, of 18 candles at 3s. 6d.

Mr. DENISON: When you talk of compromise, who are the parties to that compromise?

Witness: The Metropolitan Board of Works, representing one large portion of the metropolis, and the corporation of the City of London, representing another. I have seen it in print that these two compromisers are conducting their case as one. The City of London, by their bill of last year, offered 3s. Whether any people have ever taken shares upon the 3s. basis in any proposed company for London has not formed an element in my judgment. My judgment is that when two powerful bodies like the corporation of London and the Metropolitan Board of Works, after having taken the best advice, arrive at the result that they can supply gas to the consumers of London at this price, the consumers are not justified, having so strong and powerful an interest in the matter, in accepting any other settlement.

Mr. DENISON: The committee can judge what the meaning of a company or corporation supplying gas is; but when you say they arrived at that conclusion, they put that conclusion in their evidence before the committee last year, did they not?

Witness: The City of London did not; the Metropolitan Board of Works did. The corporation of the City put in 3s.; the Metropolitan Board declined, I presume, having taken the best advice. I think they had the best advice that they can supply gas of 18 candles at 3s. 6d. I have faith that the board would not make such an offer to the public without they felt they were in a position to carry it out. I am aware that the City of London, having had the opportunity by all the best evidence they could get of proving their case last year, had their bill rejected by the committee without hearing the opposition to it.

Mr. DENISON: Will you show me where the Metropolitan Board have deliberately offered to anybody to supply gas to London at 3s. 6d.?

Witness: At page 5 you will find it stated—"That in the event of Government deciding to introduce a bill into Parliament for the purpose of establishing a more efficient control of the existing gas companies of the metropolis, and of vesting such control in the board, the conditions of such control should be as follows—viz., that the maximum price of gas be fixed at 3s. 6d. per 1000 cubic feet, and that the illuminating power be equal to 18 sperm candles."

Mr. DENISON: Where is the offer of the Metropolitan Board of Works?

Witness: Of course, what they demand there they are quite ready to do themselves.

Mr. DENISON: Whatever you demand of me you are quite ready to do yourself?

Witness: Yes; it would be a very strange demand on my part, if the other was not equally true to me. You seem to forget that our notice to Parliament had in it the provision that the Metropolitan Board should have power to buy up those gas companies. If they bought them up, of course they must agree to supply the public at the same price that they demand that the companies should do it.

Mr. DENISON: I do not remember any such notice being given.

Witness: Yes, it was. We will give you the notice if you like. The bill, as drafted, contained power to the Metropolitan Board of Works to buy up the companies.

Mr. DENISON: As you vouch for the Metropolitan Board, although you are not a member of it, do you remember the chairman of that board being asked this question. I find this at page 15:—"Mr. Richardson" (he is a member of the board) "whilst declaring himself in favour of purchasing the interests of the companies, expressed his fear that, if the board were bound to a lower price, with an increased illuminating power on the one hand, and on the other purchased the interests of the companies, they would be as it were burning both ends of the candle." To this the chairman replied—"No, we do not. If we control, we control" (alluding to the control of the companies); "and if we purchase, we purchase; and all these matters" (meaning the illuminating power and price) "will be in your own hands." Were you aware that Sir John Thwaites said that?

Witness: My answer to that would be, that this is the memorandum of some debate at the Metropolitan Board, a copy of which is enclosed in this letter to the person to whom it is addressed. This is without its context, and, unless I saw the whole debate, I should be sorry to express any opinion whatever upon it.

Mr. DENISON: I must now turn to 1860, for a different purpose. I think you intimated that, from your experience of the Act of 1860, you found that it had done very little for you?

Witness: I said it had fallen short of our expectations. I believe that the Act of 1860 has afforded substantial benefit to a certain extent—that is to say, the companies had the right before to charge the incoming tenant with the arrears of gas due by the outgoing tenant, and that was done away with by the Act of 1860. Next, to such an extent has it operated as to the price, that we have had a reduction of 6d. per 1000 feet generally over the metropolis, and that has conferred a boon upon the ratepayers amounting to some hundreds of thousands of pounds. Where the capitals are less and the companies are ably administered, a greater reduction than 6d. has taken place; but, when the capitals are excessive, it has been done with great difficulty. In other cases, the boon has been stinted by the conversion of a large amount of debenture stock, at 4 or 5 per cent., into capital stock, at 10 per cent., which was a great error, upon the part of one company at all events; and thereby they have inflicted upon the consumer the cost of the difference between those two interests. I think it is the Equitable Company; as to the amount, I think my memory will hardly serve me. It is a large amount—I mean over £100,000. I should say it was done by evasion of this Act of Parliament.

Mr. DENISON: That sounds very much as if you knew that there was parliamentary authority.

Witness: No; the company issued notice to their debenture holders that they could convert this debenture debt into stock; and I think that, when Parliament had liberally given them 10 per cent. dividend, with a corresponding reduction to us when they obtained that price, it was an evasion of the powers of that Act to convert the debenture debt, which was easily renewable at 5 per cent., into capital stock bearing 10 per cent. I know nothing of their parliamentary powers to do it. The letter stating that, did not refer to their parliamentary power. It made no reference whatever to the Act of Parliament.

The CHAIRMAN (to Mr. Denison): You ask him whether they have derived this benefit from the Act of 1860, and he says, "Yes;" and he tells you what benefit they have derived from it. Then he says that he thinks that the benefit ought to have gone further, and then he mentions what he believes to be the fact, that some company has converted its debenture stock, at 5 per cent., into capital stock at 10 per cent. We shall see if it is any object of ours to find out whether their Acts of Parliament did or did not enable them to do it; but it is not at all likely that the witness should know that.

Mr. DENISON: Then he should not use the language he has about it.

Witness: I expressed my belief that it is an invasion of the Act of Parliament.

The CHAIRMAN: His opinion upon that is not evidence, and certainly cannot be the best evidence.

Mr. DENISON: I should think not; but in cross-examination we must take such evidence as we can get.

The CHAIRMAN: No, in cross-examination you can ask any question to test the nature of the witness's evidence, but there must be some limit to it.

Mr. DENISON: I have tested it as far as I know it, and at the proper time I shall contradict it. (To witness:) As to the Act of 1860, how many of the 13 companies were under the General Act of 1847 at that time?

Witness: None, I think, but the Imperial, which came under it in 1854; so we certainly had the benefit, such as it was, of putting the 12 companies under that Act who were not under any restriction before as to their dividends. The Act of 1847 gave power to recoup past dividends without any limit as to time, and we obtained a restriction to six years. We only derive advantage from the Act of 1847 by the vestries complying with what have turned out to be almost impossible conditions. I am referring to the dividend clauses of the Act of 1847, and to the machinery which the Act orders to be put in force to reduce those dividends; but to arrive at a conclusion whether those statements are correct or not, that Act is virtually inoperative, and I do not think you can find a case in which those clauses of the Act have ever been enforced. I frankly admit that the companies did reduce their price when their dividends reached 10 per cent., but it was possibly in anticipation of the little agitation which we were going to get up. Up to 1860, the majority of the companies were not subject to any compulsion to give anything like 12 candles. The Imperial had gone for a special Act, and the Marylebone vestry got it put in. I think the South Metropolitan were. The modern companies south of the Thames were bound by that standard of illuminating power. Before 1860 the companies could supply or refuse to supply at their own discretion, but the Act of 1860 provided machinery which compelled them to supply, and at the same time gave them a substantial guarantee against bad debts, by requiring a person to deposit money in their hands beforehand; but the committee omitted to give us what we demanded—viz., the right to require the company to pay us 10 per cent. upon the money deposited—as otherwise the consumers were finding capital to carry on the business of the company, and we thought it was open to very great abuse that they might demand such sums which in the aggregate would form the capital of any moderate concern. Frequently I have had men come to me upon the matter under the Imperial Act, looking upon it as a hardship, and I have informed them that they must comply with the command of the Imperial Company. I do not know the extent of it. Whenever they are in doubt they demand it. I have known them to demand it of gentlemen where names have been given of the highest repute.

Mr. DENISON: In the olden days their security was that they recover the debt against the incoming tenant?

Witness: No; not that they could, but they did, by refusing to supply unless he paid it. It was a species of black-mail, which put a man in darkness unless he chose to pay an exorbitant demand. I was called upon to pay the arrears of gas-rate over six years. In 1860 we deprived them of the means of doing that. It was suggested by the companies, and we were happy to agree to it.

Mr. DENISON: Now then about the public authorities. The public authorities can call upon the companies to lay down mains in a way they could not before, cannot they?

Witness: That refers merely to the outlying districts of the metropolis, where it could be imagined it would be a loss to the company to lay a main along a public road in a suburban district, which was represented as not further than 50 yards from the first lamp-post, which in large parishes, like Lambeth, or St. Pancras, or Hampstead, is an important concession. I am willing to do you ample justice for the good you did; as I took such pains about it, I am entitled to look upon it in that light.

Mr. DENISON: When you complain of the vestries, that is not the only means that people have of finding out whether they get gas below the standard?

Witness: To the ratepayers it is, I think. No gentlemen of moderate means may enter upon the perilous undertaking of coming in contact with a great company like the Imperial, for if they fail to substantiate their charge they are mulcted in costs.

Mr. DENISON: Do you find in your experience that judges, juries, or arbitrators are in the habit of consulting the interests of great companies?

Witness: It is not that; it is that a body of ratepayers cannot go to the expense of calling witnesses. You would overlay them by evidence on your side.

Mr. DENISON: Do you know what cost all the directors and secretaries of gas-works are per 1000 feet of gas?

Witness: I do not, but I could soon take the gross total from the last returns. I did it some years ago, but not of late.

Mr. DENISON: In 1860, whenever there was any contest raised with the gas companies about their being treated ill, and so on, you always repeated this—"We are giving you a great boon by districting, and putting an end to competition."

Witness: We did; we regulated the monopoly.

Re-examined by Mr. WEBSTER: I think all the advantages have been named which were obtained by the Act of 1860. As far as regards the illuminating power, the reduction in the price of gas, and the slight protection of the individual ratepayer, that we did not obtain.

FOURTH DAY—TUESDAY, MAY 28.

Mr. WEBSTER applied to the committee that the opponents of the bill should be required to furnish the following returns:—1, The capital of each of the companies, at intervals of, say 5 years, for the last 20 years, distinguishing share and loan capital. 2, Maximum statutory dividend (if any)

on the whole capital, or on any part or parts thereof, of each company. 3, The actual dividend paid by each company for each of 10 years, prior to 1860, and for each subsequent year, down to the present time. 4, The amount set aside by each company in each year to the same period as reserve. 5, The amount paid by each company for damages in each year in the same period. 6, Price per 1000 feet of gas for the last 20 years, distinguishing between common and cannel. 7, Price per street lamp per annum charged by each company for the same period. 8, The accounts for 1866, under the Act of 1860. Each of these related to matters more or less under discussion with regard to one or other of the clauses of the bill; they were all essential, and he did not know if his learned friend, Mr. Denison, had any objection to any of them.

Mr. DENISON said he had no doubt his learned friend could have the accounts for 1866, but required a little time, as the companies were very busy attending to this case; and with regard to the other matters he said he doubted whether any practical advantage would result from inquiries carried back as far as 20 years, as the object would only be to see how the Act of 1860 operated, and suggested confining the inquiry to 10 years, the details for which period could be obtained in a few days. With regard to most of the items the learned counsel said his friend's clients could have obtained them from their Acts and from the parliamentary returns.

Mr. RICHARDS said it was doubtful whether the amount paid for damages by each company in each year could actually be produced, but the companies would do the best they could.

The CHAIRMAN did not think there could be any difficulty about that, as there must be an account, which would show what was paid in damages.

Mr. DENISON said they could not pin themselves accurately to each year, but they could give the total of what had been paid in 10 years.

Mr. RICHARDS said the prices paid for street lamps would take a long time to ascertain, because some companies lighted 20 or 30 different parishes, some of them even repairing their own lamps. They might be prepared in a couple of days.

Mr. DENISON: I dare say in a couple of days. But we have got to consider that we are defendants here, and are not bound in any way to give those things. The promoters are bound to prove their case. It is a sort of *ex gratiâ* concession doing it at all.

The CHAIRMAN: I do not think that we should ask you to give that which is accessible to the promoters, and which they can copy from public documents; but with regard to what is not accessible in that way, I cannot understand that there can be any difficulty in producing the information if you consent.

Mr. DENISON said there was no difficulty except the trouble, and again suggested the information required should be limited to 10 years.

Mr. WEBSTER pressed upon the committee to get the details for 20 years, as the 10 years only carried them back to three years before 1860.

The CHAIRMAN: The Gas Clauses Act was passed in 1847, and the time for which you ask will give us information applicable to the whole of the time since the passing of that Act. I think that is a sufficient reason for asking for the returns for the whole of that time.

Mr. *R. Bell*, examined by Mr. WEBSTER.

I have been manager of the Rochdale Gas-Works for 20 years. They belong to the corporation. The working expenses for the year ending March 31st, 1866, taking 12·442 tons of coal, were 2s. 8½d. per ton; but excluding coal and cannel, 6s. 2d. per ton. In the working expenses the cost of the lime was £278 13s.; labour, £2568 13s. 7d.; printing and stationery, £94 0s. 3d.; rates and taxes, £304 7s. 10d.; repairs, £592 2s. 11d.; that makes the total cost of 6s. 2d., excluding the raw material. Cannel cost £9385 4s. 2d. I have not the number of tons separate; they are in the gross 12,421 tons.

The CHAIRMAN: If this is to attain any object, that object must be made more clear to us.

Witness: The cost of the coal is £212 12s. 6d.; that would be about 400 tons of coal out of the whole amount.

Examination continued: The number of cubic feet of gas sold in the year was 101,741,000, giving 9d. as the cost for manufacture per 1000 feet.

The CHAIRMAN: We want a little increase of illuminating power. Where are we? We have got 12,442 tons of coal and cannel combined, but I suppose it will be necessary that we should have them separately if we are to draw any conclusion from this.

Examination continued: During the winter months we use all cannel, but during the summer we use a little coal. That 400 tons seems to be about the proportion—it is about one-thirtieth. The cost of gas at the consumer's meter is 2s. 8½d., per 1000. Our gas is regularly tested by Professor Roscoe. The test was 21 candles. He has tested over that, but call that full. Making a reduction from that 21 candles to 18 would perhaps take off 1½d. or 2d. a candle, leaving 2s. 4d. as the cost of 18-candle gas. We pay 4½ per cent. interest on our capital. Taking it on a ton of coal, and adding interest at the rate of 9 per cent. on a capital of £4 per ton, would be about 11d. That would be 3s. 3d. per 1000 feet. I think it a fair estimate of 18-candle gas to pay 9 per cent. on the capital. I have a table showing an analysis of the workings during 10 years.

Cross-examined by Mr. DENISON: Do you make out that your capital is equal to £4 per ton of coal burned?

Witness: No; that is a calculation.

Mr. DENISON: But is that the result of those figures?

Witness: No.

Mr. DENISON: But as you give that evidence, how much does your capital work out to per ton of coal?

Witness: I have not worked it out. I calculated that the works could be erected——

Mr. DENISON: But I am talking of what they are. The capital here seems to be £70,000 in round numbers—a little more. "Extension of works this year"—that is the capital, I suppose?

Witness: That is right. But I should explain that when the works were purchased from the late company by the commissioners, they gave a great deal more than the intrinsic value of them.

Mr. DENISON: You think so, as the Halifax gentleman thought the other day. What do you mean by "intrinsic value"?

Witness: They were valued by a competent valuer at £16,000, and the commissioners gave £27,000 for them. I do not know why they did so. They were paying 10 per cent. then, or more. The price of labour at Rochdale is considerably less than it is in London. The price of cannel is going up. The price we are giving at the present time is 17s. 4d.; last year it was 15s. 10d. The year before it was 15s. 10½d., and the year before that 17s. 4d.

Re-examined by Mr. WEBSTER: In former years we have paid as much, and even more than 17s. 4d. In 1856 it was 15s. 10d. In 1863 and 1864 the price was 17s. 3½d. and 17s. 4d.; so that the price is not dearer now than it was three years ago. I do not think the residual products rise in price with the value of the cannel. They do not in Rochdale. I cannot give the committee the demand for residual products at Rochdale as compared with other places. Other places have a better demand. We have had to sell them at 3d. per cwt. in the winter season, or 5s. per ton. The £16,000 was the structural value of the works.

Mr. O'MALLEY said that was all the evidence with which he proposed to trouble the committee on the subject of illuminating power and price, abstaining from going into the general question, because evidence of that kind was already to be found in the printed evidence referred to the committee.

Mr. DENISON said he was a little taken by surprise at the absence of Dr. Letheby, and in calling his evidence he should be obliged to do the best he could.

(*To be continued.*)

Parliamentary Intelligence.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Ordinary Half-Yearly Meeting of the Proprietors of this Association was held on Tuesday, May 28, at the London Tavern, Bishopsgate Street—BENJAMIN ATTWOOD, Esq., in the chair.

Sir MOSES MONTEFIORE, the president, said: Gentlemen, I am very thankful to be allowed the honour of being present to-day to meet you, and I hope you will gratify me by requesting my excellent friend, Mr. Attwood, to take the chair.

The proposition being agreed to,

The CHAIRMAN called upon the secretary to read the notice convening the meeting, which having been done, the corporate seal was affixed to the register of proprietors.

The SECRETARY (Mr. Albert F. Jackson) then read the following report:—

The present half-yearly ordinary meeting of the shareholders has been convened, in pursuance of the company's Act of Parliament, for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring a dividend for the half year ended the 31st of December last.

It affords the president and directors much pleasure to be enabled to report that the workings at all the stations have been good, and that the business of the association during the last half year has, upon the whole, been of a satisfactory character. The total quantity of gas made in the half year was, in round numbers, 1670 millions of cubic feet, being about 89 millions in excess of the quantity made in the corresponding half of the previous year, or rather more than 5¼ per cent. There has also been an increase of about 48,000 in the number of lights, which is at the rate of 7½ per cent. Owing, however, to the reduction we have been compelled to make in the price charged for gas, the rental has not increased in the same ratio of proportion.

As it has always been, so it will ever continue to be the most anxious desire of the president and directors on all occasions to meet, as far as possible, the demands and the wishes both of the public authorities and the private consumers of gas in all the towns lighted by the association, not only by making reductions in the price charged whenever circumstances would permit of any reduction being made, but also by improving the quality and increasing the illuminating power of the gas from time to time to the utmost extent practicable; and in this respect the endeavours and the desire of the president and directors have been most effectively carried out by the numerous intelligent engineers at all the stations, acting under the directions of Mr. Drory, our able chief superintendent on the Continent.

As in England, so on the Continent the price of gas coals has very considerably increased in the course of last year, and at several of the stations occupied by the association the value of the residuary products, such as coke and tar, has greatly diminished; yet it is highly gratifying to the president and directors to be able to state that, notwithstanding these adverse circumstances, the amount of net profit realized during the half year now under consideration, is more than that of the corresponding half of the previous year, instead of being less, as might have been expected.

At *Cologne* the new contract for lighting that town, referred to in the last report, has not been definitely settled, the authorities of the town not having been able as yet to obtain the approval of it by the proper Government officer, without whose ratification the Government contend it cannot be made a full and binding contract. That officer has required certain grave alterations and additions to be inserted in the contract as the condition of his ratification; but the president and directors have, after full consideration of these modifications, felt themselves unable, in the interest of the association, to agree to them. Under these circumstances the matter is in course of determination in the courts of law. Meanwhile the lighting of the town has not been interrupted, nor have the public or private consumers of gas experienced any inconvenience.

At *Toulouse* a difference of opinion has arisen between the town authorities and the association as to the exact date of the expiry of our concession for the private lighting. The town maintains that the concession expired on the 26th of February last, the association contend and insist that it will not expire until the 26th of February, 1871. The town has initiated certain legal proceedings which must entail a judicial decision of the question in the courts of law. Meanwhile we continue to supply private lights as heretofore in competition with a local company, who have the contract for the public lighting of the town.

There does not appear to be anything at any of the other stations which requires, on the present occasion any particular observations from the president and directors. They, therefore, now beg to call the attention of the shareholders to the scheme for the dividend and bonus, which has been prepared according to the provisions of the Act of Parliament, and it is very satisfactory to perceive that the accounts for the half year ending the 31st of December last show such an amount of profit realized as will justify the making of the same large extent of dividend and bonus as was declared at the last half-yearly meeting—viz., a dividend of £2 10s. per share, and a bonus of £1 per share, payable on the 15th of June next, free of income-tax, and at the same time leave an amount which they trust will be adequate to meet contingencies, and for the necessary enlargement, repairing, and improving the numerous works of the association.

It affords the president and directors sincere gratification to find that the result of the last half year's operations of the association is such as to admit of the continuance of the same distribution of profits among the shareholders as was made for the preceding half year, notwithstanding the many adverse circumstances which, during the last year, they have had to encounter. This further experience proves most clearly the advantages of a strict adherence to that line of policy in the conduct of the affairs of the association which the president and directors have uniformly adopted, of making sufficient provision for the many contingencies to which the affairs of this association must of necessity be subjected.

The president and directors have now to deplore the death of another of their colleagues, Benjamin Cohen, Esq. That gentleman had been a director for more than thirty years, during which time, by his constant attendance and by the exercise of his great practical knowledge and sound judgment on all matters of business, he contributed largely to the prosperity of the association, and the president and directors greatly regret his loss. Measures will shortly be taken by them to fill up the vacancy thus occasioned at the board.

The directors who now go out of office are John Wilkin, Esq., and Nathaniel Montefiore, Esq.; and the auditor who goes out of office is Joseph Sebag, Esq. These gentlemen are all eligible for re-election, and offer themselves accordingly.

The CHAIRMAN, in moving—"That the report now read be received and entered on the minutes," said the report contained so full a statement of the affairs of the association that he did not think he could throw any more light upon them by any observations of his own; but if any of the proprietors wished to ask questions, he should be very happy to furnish all the information in his power.

Mr. CATER asked whether the fact of the large and growing balance now standing to the credit of profit and loss had been under the consideration of the president and his colleagues in the direction; and whether, taking it into consideration, they thought it necessary to adhere to the same conservative policy to which he had already once or twice called their attention,

or whether they had any scheme by which the present proprietors were likely to be benefited by having a much greater return for their money than was now proposed. He asked this question because, upon a comparison of the figures in the accounts of the present and previous years, he felt that something ought to be done either to increase the value or dividend upon the shares, or, if that were impracticable, to increase the number of those shares. In addition to paying 7 per cent. half yearly to the proprietors, they were now laying by nearly £100,000 a year for contingencies. The present position of the association was this: they had on the credit side of the balance-sheet a paid-up share capital of £1,225,000, with debentures to the extent of £123,000. On the other side there was a balance of about £50,000 invested in Consols; debts due to them, £224,000; and stock in hand, £252,000, against debts due by the association of £85,000. There was, therefore, a very large surplus, quite sufficient to carry on the concern with. He was not an advocate for so crippling a company of this description that the directors would have to go to the public for money, or else remain indebted to their tradesmen abroad. On the debit side of the account the capital was represented by works and plant to the extent of £1,946,818, which sum would now be augmented by the amount mentioned in the scheme of £57.961, as the sum to be added to capital for outlay on the works. These works were, no doubt, all productive; and from what he had heard in other quarters, as well as from what he knew of the property and the manner in which the accounts had been kept, he had no doubt that, if the concern were to be broken up to-morrow, the works and plant would sell for much more than was at the debit of the capital account. He mentioned this for the purpose of impressing upon the directors that they had property of a very valuable character. In his opinion—though perhaps he might not be correct, not having had the same experience as the directors, nor being so much behind the scenes as they were—the works of the company might be taken to be worth fully £2,000,000. With the amount due to them and the stock in hand, the association really had about £2,500,000 in *bonâ fide* assets. Why, then, should not this capital be represented by an equivalent number of shares? And if their Act of Parliament did not give them power to issue shares to that amount, why should not the directors be prepared to go to Parliament for an amended Act? Probably he should be met with the statement that it was very imprudent to go to Parliament just now, seeing that the public were wanting to do acts of injustice towards gas companies. Attempts, he was aware, had been lately made to set aside the provisions of solemn Acts of the Legislature in connexion with some of the long-established gas-works of this country. But he had reason to hope that those attempts would not be successful; at the same time, knowing that such attempts had been made, he did not wonder that the directors hesitated before making up their minds to go to Parliament. Still, they should bear in mind that the association had nothing to do in those respects with the British Parliament. All their concessions were for works abroad, and were for a series of years, during which the rate at which they supplied gas was fixed, although, as they had heard that day, and had been informed on several previous occasions, that price had practically been considerably reduced. What was the fact with regard to the increase of their business? On two former occasions it was stated that they had obtained 42,000 or 48,000 new lights. They also had it reported to them that the reduction in the price of gas had caused such an increase in the revenue that they had been able to make an additional profit in the half year of £19,000. Looking at the figures of the accounts, they found that during the last half year the profit had been, in round numbers, £156,000, as against £140,000 for the previous half year, showing a further increase of £16,000. Two or three years ago they had £700,000 to the credit of profit and loss. The profit of the last half year would enable the directors, if the dividend and bonus proposed, amounting to £98,000, was accepted (and he was sorry to say the proprietors had no choice under the Act of Parliament, for they could not move to increase the dividend), to carry to the profit and loss account £57,960, which added to the amount already standing to that account, made a total of upwards of £1,000,000. If such a scheme as that which he had before shadowed forth were carried out, they might take £175,000 from that account and add it to capital, and still get £6 dividend on each share, and put by £60,000 to the increase of the balance, or £140,000 a year in all. Of course, it was a very pleasant thing to know that they had such a state of affairs before them at this time, and he thought the directors were entitled to the highest credit for the manner in which they had worked the concern. He believed that very few, if any, other companies could show a state of accounts like that. At the same time he felt there was a limit to prudence in laying by money to meet contingencies. If the directors only laid aside sufficient money for the purpose of reinstating plant and keeping it in absolutely good working order, he, for one, should not have a word to say; but he thought, with all these accounts before them, they should not go on increasing the property of the association in value. During the past half year they had had 48,000 lights added to the private consumption, 48,000 the half year before, and about the same the year before that; so that they had now nearly 150,000 additional lights, requiring not one shilling of capital to be called up, and yet the proprietors were getting nothing for it—it was all going to increase the item of pr fit and loss. Surely the amount should be applied in some other way. He merely called these facts before the directors again, for he should be one of the last to distress a board at any time, knowing that their duties were very arduous, and that, in the present instance, they were entitled to the hearty thanks of the proprietors for the manner in which they had performed those duties. It was, therefore, most painful to him to have to allude to these matters, and he only did so because he felt that the directors were going too far in their conservatism. They were accumulating property far beyond what was necessary; in fact, they were carrying out the Tontine system—the longest liver would get the most, and that was not a course which, in his opinion, ought to be adopted in an undertaking of this kind. He did not intend to propose any resolution upon the subject; the only resolution he could propose would be to ask the meeting not to receive the report, and, if that were carried, the only effect would be to postpone the payment of the dividend. He might, perhaps, get a committee to confer with the directors, to see what could be done; he might ask the proprietors themselves to hit upon some plan more satisfactory to them; or they might resolve to go to Parliament for a fresh Act; but all these things were opposed to the directors, and therefore he did not recommend them. He merely thought it his duty in his position to bring these matters again before the meeting, and to ask the attention of the directors to them.

A PROPRIETOR wished to follow up the remarks of the last speaker by asking one question. Last half year the directors appropriated £42,000 for contingencies. Would the chairman have the kindness to state how much of that £42,000 had been expended, and in what manner, specially distinguishing between the erection of new works and the keeping of old works in repair? If this question were replied to, it might throw considerable light on the remarks made by Mr. Cater.

Another PROPRIETOR said the bonds of the association now figured in the accounts at £123,400. He wished to know over what time those bonds would run—whether they were for a limited number of years or were spread over a considerable period. Having alluded to this subject, he would further remark that in the half year ending Dec., 1864, the association made a profit of £144,440; last half year the profit was above £155,000—or about £11,000 additional—so that they had earned about 5 per cent. upon the £200,000 since paid into the capital of the concern. He thought, if they were to get rid of the bonds, the directors might be able to do something in the shape of capitalizing the profit and loss.

The CHAIRMAN said if there were no other questions to be asked he would proceed at once to reply to those which had been propounded. As to the question put by the honourable gentleman to his right (Mr. Cater), whether the directors had ever considered the propriety of increasing the number of shares, he could assure that gentleman the subject had been perpetually before them; over and over again it had been discussed time out of mind. A report was presented at the last half-yearly meeting having reference to this point. The request had been made by several of the shareholders that a legal opinion might be taken whether any more shares could be distributed, amount paid up, as the shares now were. The directors accordingly did take the opinion of two of the most eminent counsel at the British bar, one of them being Sir Roundell Palmer, and they gave it as their opinion that it could not be done. There was an end, therefore, to that question. With regard to the observation as to the expediency of making a larger divided upon a greater number of shares, the proprietors must bear in mind what he had often stated to the meeting, that the dividend was made out of profits. If the number of shares was multiplied *ad infinitum*, it would not add to the profits; there would be no more money to divide then than there was now. They could not increase their profits by increasing the number of shares. The profits were derived from making gas, not from making shares. Under these circumstances the only question was whether any larger proportion of the profit now made could be distributed as dividend or bonus. That was a question which it was futile to suppose, if the directors were polled, there would be any difference of opinion upon, supposing it were practicable. Look at their individual interests. Could it be supposed that if they did not care for the shareholders at large, they would not care for themselves? But the only means the directors had for providing for extensions of the works was to lay aside a proportion of the profits; they could not make further calls, or if they did the dividend would be so much less per cent. The money must be expended, the association being under contract to light these towns, and if they did not supply gas the contracts would be broken, so that they must keep up the works for that purpose. And not only so, but in every town the natives were jealous of the presence of foreigners, and would be right glad of the opportunity to set up works of their own. The only way in which the association could maintain their ground, and make a large distribution of profits among the shareholders, was by providing the means, as they had hitherto done from time to time out of those profits, for extending and increasing their works, so that if any new companies should attempt to establish themselves in those towns, they would have to advance capital upon which they could only realize 2 or 3 per cent. People were, therefore, afraid to establish companies in any town where the association had extensive works for the production of gas, and were able to compete with them. But, then, when the contracts of the association were expiring, and they sought to renew them, they found that their profits were cut down, and it was only by the policy which the directors had adopted that they were able to meet this state of things. He believed that if they continued to act upon the basis on which the concern had hitherto been conducted, they would still be in a position to pay a large amount of dividend. They could not increase the shares without going to Parliament, and if they did they would probably be told they were making too much profit, and must reduce the price of gas. They did not want Parliament to tell them that; every town told them so, and they had already reduced the price, and would have to make still further reductions from time to time. With respect to the observation of the next speaker as to the bonds, he might state that they were all at various dates—some for three, others five, and others ten years, and therefore they were running off at different periods. As they had run off hitherto they had been renewed. It was suggested that it would be better to pay off these bonds, and save 5 per cent. But it must be remembered that while they paid 5 per cent. interest for the money, they made 10 per cent. profit from the use of it. As to the question of the honourable gentleman who asked the precise mode in which the £42,000 taken last half year for contingencies had been expended, he could only say that was a matter of detail which he was not prepared to answer. Out of sixteen different stations, this expenditure was, more or less, going on continually at every one, and therefore it was impossible for him to say whether £15,000 had been spent at this place or £10,000 at another. It would be necessary to bring all the ledgers to the meeting, and it would take four or five hours to read them through to give a detailed answer to the question in the manner in which it was put. But the honourable gentleman might rest assured that either upon old works or new the money had been all expended, and that further expenditure of the same kind must go on so long as the prosperity of the company continued. Further than that he could not answer the question.

Mr PRICE said he did not quite catch what the chairman had stated, but as far as he understood the remarks they were to the effect that the directors had taken counsel's opinion, which was that they could not write up the shares.

The CHAIRMAN: No, I beg your pardon—that we could not issue new shares.

Mr. PRICE said he understood that one of the honourable proprietors who had spoken recommended that the directors should call up the existing shares. That, he apprehended, could still be done. It was a suggestion which he had made on more than one occasion, and he should like to make it again, not that he thought it would have much effect, but that it might be a protest against the present policy of the directors. He thought they ought to make a call upon the shares, and therewith pay off the debentures. It was not as though the company was short of capital; if they were, he could understand that raising money upon debentures was an admirable way of supplementing their resources. But here there was no want of it—they had a plethora of capital. That capital was all invested on the Continent, where, if anything should occur, it would involve a certain amount of risk. And yet the directors went on half year after half year adding to that risk, and giving the proprietors no more dividend than they had had for some years past. What he desired to impress upon them was, that if they were running all that risk they ought to have an amount of capital in their books representing that risk. But they had not got it; for a share capital of £1,225,000 and a debenture capital of £123,000 did not represent the value of the property of the association upon the Conti-

nent. Therefore he thought the argument of the honourable proprietor at the other end of the table was a sound one—pay off the debentures, and pay them off by calling up the shares. It was quite true the debentures were only involving 4½ or 5 per cent. interest, but he felt sure it was more to the advantage of the shareholders that they should get the profit on their shares, and that the debenture holders should be paid off—and this was what he had been trying to get for years—so that the actual fixed capital on the Continent should be represented by capital in the books of the association. He did not want to go into the figures again, to show that this was not the case now; but he did feel very strongly that, notwithstanding the ability with which the affairs of the association were conducted, the present proprietors were not getting their share of the profits. The dividend and bonus which it was proposed to give them on this occasion was no doubt handsome, looking at the state of things in other companies, still he considered that the £3 10s. per share did not at all represent the profit they had earned during the past half year. Some time ago an honourable director told him that the shares of the association were not worth £60, and never would be worth more. He believed that honourable director still held on at £97. He (Mr. Price) was thankful for small mercies. They had got something out of the directors; it was unwillingly and grudgingly given, but the force of argument repeated, drop after drop, and year after year, did get that from them, notwithstanding the protests of the chairman and his colleagues, and he thought the proprietors were indebted to the opinions expressed by Mr. Russell, Mr. Maughan, and himself for having brought about the present state of things. But having got the directors into the right groove, he found there was a disposition on their parts to shunt off again into a siding. He hoped, however, by a little gentle pressure, and he did not care how gentle if it were successful, to induce them to make a call of say £2 10s. or £5 a share, with which to pay off the debentures, and in that way they would set at rest all agitation for a considerable period. The Reform Bill was now successfully passing through Parliament, and it was said that if it had been brought forward earlier the public would not have wanted so much as they now demanded. He hoped the directors would take the hint, and give the proprietors something to make them more happy, which he was sure they all very much needed.

The CHAIRMAN said the honourable proprietor asked why the shares had not been increased. He had already explained that they could not issue paid-up shares, which was the proposition put forward by Mr. Maughan and Mr. Michael, counsel having advised them, as stated in the last report, that such a proceeding would be contrary to law. It was a measure which could not be effected without the consent of every shareholder in the association, and if one shareholder dissented he could put a veto upon it.

Mr. PRICE: Cannot you make a call?

The CHAIRMAN: No doubt we could make a call of £6 5s. upon all the shares. The sum paid on each of the shares is £43 15s., therefore every shareholder is liable to the extent of £6 5s., which the directors can call any time they think proper, but they see no occasion for it.

Mr. PRICE: To pay off the debentures.

The CHAIRMAN said the directors had no desire to do that, since they borrowed the money at 5 per cent. and made 10 per cent. by it, which enabled them to pay the large dividends they did.

The motion for the adoption of the report was then put and carried unanimously.

The CHAIRMAN then moved—"That a dividend be declared of £2 10s. per share, and a bonus of £1 per share, payable on and after the 15th of June next, free of income-tax."

The motion was unanimously adopted.

The retiring directors, Messrs. Jno. Wilkin and Nathaniel Montefiore, and the retiring auditor, Mr. Joseph Sebag, were severally re-elected, and a resolution increasing the remuneration of the auditors from 40 guineas to 100 guineas, per annum was adopted.

Mr. SEBAG acknowledged his obligations to the proprietors on his re-election, and thanked them for himself and colleague for the increase voted in their remuneration.

Mr. WALMISLEY moved a vote of thanks to the superintendent and the other officers of the company for their attention to their respective duties.

Sir MOSES MONTEFIORE said he had great pleasure in seconding the vote, for he felt that the association were much indebted to Mr. Drory and the other gentlemen at their different stations.

The motion was very cordially adopted.

A vote of thanks to the directors was then passed, which the chairman acknowledged, and the proceedings terminated.

THE WATER SUPPLY OF LONDON.

By Dr. FRANKLAND, F.R.S., &c., &c.

[*A Discourse delivered at the Royal Institution of Great Britain, on Friday, March* 29, 1867.]

Another attack of the most terrible epidemic to which modern London is still exposed, has once more called the attention of the public to the serious defects of the metropolitan water supply. The origin and spread of cholera is still confessedly involved in much obscurity, but the experience that we have derived from four visitations of this epidemic leads irresistibly to the conclusion that though no successful barriers have been devised against the introduction of the disease into this or any other country, cholera can never establish itself as an epidemic unless the water supply of a community be tainted with impurity. Thus, Manchester, which suffered frightfully from cholera in 1832 and 1849, while supplied with impure water, escaped this disease almost entirely in the two subsequent visitations of 1854 and last year, only a few sporadic cases of the disease appearing in that town after the water supply had been changed from its original impure source to that of the Derbyshire hills, from which Manchester is now furnished.

The violence of the epidemic, as Dr. Farr shows, exhibits also a close relation to the degree of sewage contamination in the water supply. Thus, we had it demonstrated, in the visitation of 1849, that amongst those portions of the metropolitan population supplied with water from the Thames at Kew, the mortality was 8 in 10,000 persons living; amongst those supplied with water taken at Hammersmith, it was 17 in 10,000; amongst the inhabitants of Belgravia, St. George's, Hanover Square, Chelsea, and Westminster, supplied with water taken below Chelsea Hospital, it was 47 in 10,000; whilst among the populations drawing their supply still lower down—viz., at Battersea and between Hungerford and Waterloo Bridges, where the water was still more foul—the mortality was 163 in 10,000 persons living. In 1854, when half of this latter district was supplied with water taken above Teddington Lock, the deaths fell to 87 in 10,000, or a little more than half the number at the previous visitation; while last year, when the whole of the supply was taken above Teddington, the loss of life was only 8 in 10,000.

The water withdrawn from the Thames is now all taken from above Teddington Lock, and its filtration before distribution is rendered compulsory by the Metropolitan Water Act of 1852. The wisdom of drawing the water at a higher point cannot be doubted, and it was proved that in those districts of the metropolis where the companies supplied only filtered water from the Thames the mortality was very slight last year.

Far different, according to the Registrar-General's report, was the fate of that portion of the metropolis which had the misfortune to be supplied with water from the reservoirs of the East London Company at Old Ford. The suddenness and virulence of the attack in that district induced the Registrar-General to request me to make an examination of the water supplied. I found that the chief reservoir at Old Ford was close to the river Lea, which is there little better than an open sewer; it was also sunk 16 feet below the ground. The water in this reservoir would always be below Trinity high-water mark, and I pointed out that the sewage from the river and the surrounding soil, which is saturated with sewage, must find its way into that reservoir, which is 2½ acres in extent. This opinion has since been confirmed by a recent investigation of this reservoir, when emptied, as far as possible, by pumping. The mortality in that portion of London supplied from these reservoirs was frightful, for while the deaths in other districts supplied with water from other sources varied from 2 to 12 in 10,000, they ranged from 63 to 111 in 10,000 in the district supplied from Old Ford.

London is at present supplied with water by nine companies, which deliver in the aggregate 108 million gallons daily. These figures are very easily read off; but we have very little idea, from looking at them, of the vast mass of water which is every day poured into the metropolis. We shall get a better idea if we compare it with some well-known magnitude. Let us suppose, for example, that it was all stored in a reservoir of the size of Westminster Hall. It would require that the walls of that reservoir should be raised to the height of 1070 feet, or three times as high as the Victoria Tower, to contain the daily supply of metropolitan water. If we take this theatre as our measure, assuming that the building were square, it would require that the walls should be raised to a height of more than half a mile to contain the daily supply of water to London. It is thus evident that the business of supplying this necessary of life is one of formidable dimensions. It is a question which is surrounded with enormous difficulties, and it is no wonder that with such an immense supply required every day these difficulties should not in all cases be overcome.

Five of these companies abstract about one-half of the total supply from the Thames above Teddington Lock; two of them derive their supply from the river Lea—*i. e.*, the East London and the New River Water Companies; and two from artesian wells and springs—these are the Kent and South Essex Water Companies. The daily supply of water to the metropolis is about 30 gallons per head, and the rate of increase in the quantity required is very rapid. In 1850 the supply was only 44½ million gallons daily, in 1856 it was 81 million gallons, and last year it was no less than 108 million gallons.

You are aware that it is now proposed to improve the metropolitan wate supply, and five schemes have been recently brought forward to effect this object. The first scheme is that of Mr. Bateman, who proposes to go to the sources of the Severn for his supply. The second is that of Messrs. Hemans and Hassard, who propose to draw water from the Cumberland and Westmoreland lakes. The third is the scheme of Mr. Telford Macneil, who proposes to pump the Thames water above Teddington Lock, and convey it to the Bagshot sands for the purpose of filtration before distributing it in the metropolis. The fourth is the plan of Mr. Bailey Denton, who would construct storeage reservoirs near the sources of the Thames, and thus avoid a good deal of the contamination with which the water is at present affected, and also, by impounding flood waters, obtain a larger supply than could be now abstracted from the Thames with impunity. The fifth is the scheme of Mr. Remington, who proposes to draw a supply from the hills of Derbyshire and Staffordshire—chiefly from the opposite slope of those hills which furnish the water supply of Manchester. The last three of these schemes have scarcely assumed a shape which makes them ready for discussion from a chemical point of view. We know little or nothing of the quality of the water afforded by these schemes, and inasmuch as it is not my object to enter at all into the engineering part of the question, but to direct your attention chiefly to the chemical points which arise in connexion with the water supply of the metropolis, I shall avoid making any remarks upon the three last schemes I have mentioned.

We will, therefore, begin with Mr. Bateman's scheme. It consists, as I have already mentioned, of a proposition to draw the supply from the mountain ranges of Wales, or at least from certain of those mountain ranges, known as Cader Idris and Plynlimmon, which form the upper source of the main tributaries of the river Severn. These Welsh mountains rear their heads into the moist atmosphere, which is almost constantly wafted on to our island from the Atlantic. There is a great condensation of this moisture on the hills, so that there is a great rainfall there. In fact, it measures from 70 to 150 inches per annum. This scheme is depicted by the green lines on the map. You see it originates in two main branches in this mountainous district, which branches unite at Mertonmere, from whence the combined waters are conveyed by an aqueduct to a point about 10 miles from London, where there would be a storeage reservoir sufficient for many days supply, at a height of 250 feet above Trinity high-water mark. By this scheme 220 million gallons of water would be transmitted for the daily supply of the metropolis. At first, however, it is only contemplated to supply 120 million gallons daily, which would be 12 million gallons in excess of the present supply. Doubtless some of the present supply could be utilized for non-domestic purposes, and thus the quantity of purer water which we should obtain from this source need not, in the first instance at least, be so large. From this reservoir the supply would be constant; we should have the water at command day and night, as is the case in most of the principal cities of Great Britain at the present time. The length of the conduit required by this scheme would be 183 miles, and the cost of the works for the delivery of these 220 million gallons of water per day is estimated at £16,850,000. In order to meet this expense there would be required a domestic rate of 10d. in the pound, and a public rate of 2d. in the pound. I have to-day been looking at my water bills, and I find that at the present moment I pay at the rate of 1s. 5d. in the pound for the water supplied to me by the New River Company, so that I do not think we should quarrel with the rate proposed to be levied for this improved supply.

The gathering-ground which Mr. Bateman utilizes on the slopes of the Welsh mountains is 204 square miles in extent, and consists of uncultivated land, the water from which is apparently of great purity. Its investigation has not yet been carried out very minutely, but such an investigation is to be made. I have here a specimen of the water, for which I am indebted to Mr. Bateman. It was taken at the time of flood, and does not fairly represent the supply from the storeage reservoir on the mountains. But if we are to take the water which collects in Bala Lake, which receives the drainage from the opposite flank of one of these mountain ridges, as a guide to the quality of the water on the other side, I consider it would be inferior to none

supplied at the present time to any community, and fully equal to that obtained from Loch Katrine for the supply of Glasgow.

The second scheme for the future water supply of London is that of Messrs. Hemans and Hassard, who propose to lay under contribution the grand condensing surfaces which lie on the slopes of the Westmoreland and Cumberland mountains, where, as every tourist knows, rainless days are rare exceptions. I was amused to-day, in looking over Messrs. Hemans and Hassard's scheme, to observe the number of rainy days in that district. I found that in one year at Keswick it rained on 229 days out of the 365, so that that gives us a prospect of a very fair supply of water. At Loweswater, the number of rainy days in a year was 217; at Wastdale Head, 243; whilst at Seathwaite (which is perhaps in a still more unenviable position) at the entrance of Borrowdale, the number of rainy days was no less than 332. Now, the average rainfall in this district, taken from a number of observations, is estimated at 100·56 inches; and in this district, as is well known, much of the water is received in natural lakes, three of which are proposed to be utilized by the present scheme—viz., the well-known lakes of Ullswater, Thirlmere, and Haweswater.

There is obviously a great advantage in this scheme in having natural storeage reservoirs. These three great lakes prevent the necessity for constructing immense reservoirs, which Mr. Bateman would have to do in order to carry out his scheme in the Welsh district. But this advantage is counterbalanced by some disadvantages. I merely mention them, but do not express any opinion, because it is purely an engineering question. In the first place, it is necessary to bring the water from a much greater distance, as every one must know from the position of the two districts. Moreover, there are some formidable tunnels involved in this scheme. One, which you see on the map, represented by a broken red line, running from Thirlmere to the foot of Ullswater Lake, extends in one place for eight miles. Then you have a second which will go from the head of Ullswater under Kirkstone Pass. This tunnel will be 7½ miles in length, and from the exit of this tunnel the water will be conveyed to the metropolis, a distance of 240 miles; which, as you see, is considerably in excess of the distance necessary to convey the water from the Welsh mountains. The advantage of these lakes as storeage reservoirs is also attended by another disadvantage—they must all be raised considerably by embankments at the foot of the lake. Still this is not so formidable an undertaking as the artificial reservoirs required in the Welsh district.

By this scheme it is intended to deliver 200 million gallons of water daily in the metropolis, and 50 million gallons daily to towns on the road. The long aqueduct will pass many important towns, and obviously such a splendid supply of water would be considered a great boon by them, and it is proposed, therefore, to utilize 50 million gallons per day in that way. This scheme is apparently more costly than the other. I do not know how far the expenses would be mitigated by the supply furnished on the road, but it is calculated that the outlay for the necessary works would be £13,500,000. This would involve a rate somewhat higher than Mr. Bateman's—viz., a rate of 1s. 1d. in the pound; but even this is less than the rate we are now paying in London.

The gathering-ground in this scheme is estimated at 177 square miles—*i.e.*, the rainfall from that extent of area is collected in those lakes. The quality of the water in both the schemes contemplated is very excellent, and it is impossible at the present moment to give one the preference over the other; but unquestionably both furnish water of the finest quality, and we may consider ourselves extremely fortunate if the water from either ever reaches the metropolis. I have here some samples of the water from Haweswater, Thirlmere, and Ullswater; but I should mention that they were taken during the time of flood, and perhaps are not altogether fair samples of the general excellency of the supply.

Before we can appreciate the advantages or otherwise of these colossal schemes it is necessary to consider the chemical quality of our present supply, and compare it with that of the water we should obtain from either of these new sources. I need not say that absolutely pure water is an impossibility in nature; there is no such thing as absolutely pure water to be got naturally.

The solid impurities contained in potable waters have been commonly divided into two classes—viz., the mechanical impurities, which are suspended and not dissolved in the water, but can be readily separated by filtration; and secondly, the dissolved impurities. We will leave out of the question the mechanical impurities, which being nearly all removed by filtration need not occupy our attention, and we will confine ourselves to those that are dissolved in the water. These may be further subdivided into, first, matters which are expelled by ignition in contact with air from the solid residue left on the evaporation of the water; and, secondly, matters which are not so expelled. Here, in a platinum vessel, I have the solid residue of a sample of water evaporated therein. It has a brownish colour, which is due to a portion of the substances being organic matters. On being ignited in contact with air, a quantity of matter is expelled—burnt off and volatilized—and the vessel and its contents lose weight. This loss in weight gives us the determination of the matters thus expelled by ignition in contact with air. The total solid residue contained in 100,000 parts of each of the different waters with which London is supplied is given in this table:—

Name of Company.	Total Solid Matter in 100,000 Parts. Feb.	March.
Thames Companies.		
Chelsea	28·58	30·96
West Middlesex	28·68	30·26
Southwark and Vauxhall	29·08	31·22
Grand Junction	29·44	31·54
Lambeth	29·36	32·10
Other Sources.		
New River	29·72	27·70
East London	33·56	30·36
Kent	39·84	39·90
South Essex	38·32	37·68
Water from Loch Katrine, as supplied in Glasgow	3·28	

All the first-named waters in this table are Thames waters, but they are submitted to different processes by the several companies, or, rather, are stored in the reservoirs for a longer or shorter time, so that we always notice a slight difference in the composition of the five waters, though all are withdrawn from the Thames at the same point. We have no guarantee, however, that they are all drawn on the same day, or at the same time of the day, besides which one company may have a larger extent of storeage than another; all which circumstances would to some extent affect the quality of the water. We have here, also, a table showing, by comparative curves, the amount of solid matter in 100,000 parts of the waters, and the variations in different months of 1865 and 1866. The waters from the Kent and the South Essex works—those being artesian companies—exhibit a greater amount of solid matter than the waters supplied by the Thames companies. The amount of organic and other volatile matter, as it is termed, in 100,000 parts, is represented in another diagram, the comparative curves giving the variations in the respective months of 1865 and 1866. You will observe that there was a very considerable variation in this kind of contamination from February to April, 1866, it being reduced from about 3¼ parts in 100,000 to about 1·4 parts in 100,000 parts of water.

Now, what are these matters which are expelled by ignition? They may consist, first, of organic matter, and, secondly, of the products of the decomposition of certain mineral salts, chiefly nitrates and nitrites. Formerly the salts of ammonia and a certain amount of moisture were expelled by ignition, so that these matters expelled by ignition represented a larger number of ingredients than they do at present; for now, by improved processes, we have no ammoniacal salts and no moisture driven off on the ignition. Notwithstanding this improvement, it is difficult to interpret the meaning of this loss by ignition. It may be all organic matter; in fact, there may be, as I have recently ascertained, more organic matter in a sample of water than is represented by this loss on ignition; for there are some forms of organic matter particularly liable to be present in potable waters contaminated by drainage which are not altogether expelled by ignition. Or it may be wholly inorganic, consisting of the nitrates or nitrites, the products of the oxidation of previously existing organic matter. When, however, the loss is large it throws suspicion upon the water.

But this manner of determination of organic and other volatile matters has always been considered by chemists as unsatisfactory, hence various attempts have been made to supplement it by more definite methods. It has been attempted to apply permanganate of potash to a separate specimen of the water, so as to ascertain how much oxygen is necessary to oxidize the organic matters therein. I have myself been in the habit of using this plan for nearly two years, on the supposition—though I have had doubts whether that supposition was correct—that the permanganate would oxidize all the organic matters contained in the water. Inasmuch as it is a deeply coloured substance, the solution of permanganate of potash colours a large quantity of water very intensely. Here, for instance, is a water which I believe to be contaminated with organic matter. I pour into it some solution of permanganate of potash, and you see the colour of the permanganate disappears instantly. I might pour in a still further quantity with a like result, and in this way, by measuring the quantity of a standard solution of permanganate so used, it was thought we could ascertain the quantity of oxygen necessary to oxidize all the organic matter in the water. Dr. Letheby has even gone further in the use of permanganate for this purpose, considering that eight parts of oxygen thus consumed correspond to one of organic matter in the water. I have frequently noticed the irregularity in the action of the permanganate, and have therefore instituted a number of experiments to ascertain whether it does act with regularity upon all kinds of organic matter, or upon some particular kinds only, and I will endeavour to bring these experiments substantially before you. I have here on the table a number of jars containing the same amount of water, and each jar, with the exception of the first one and the last, contains the same amount, by weight, of different kinds of organic matter. Now, I am going to add successively equal volumes of this permanganate solution to each of the jars in this series. The first jar contains distilled water, and we shall find that it will retain its pink colour after the addition of one volume of the permanganate. The next contains a certain per centage of sugar, which will be the organic matter in this case. On adding the permanganate the colour does not disappear. The water in the next is contaminated with the same weight of starch—the colour does not disappear. Here is a water contaminated with the same weight of urea, and again we find the colour does not disappear. Another of these waters is contaminated with creatine, that being an animal product; the next is contaminated with alcohol; the next with the same amount of gelatin; the next with the same weight of oxalic acid; and, finally, I have here a jar which does not contain a trace of organic matter of any kind, but a material frequently present in—indeed rarely absent from—the potable waters of London—viz., nitrite of soda. We may divide this set of jars into two classes, and you will find that in the first five the colour of the permanganate will not be destroyed, whereas in the last four it will entirely disappear. The colour of the permanganate poured into the jar which contains nitrite of soda but no trace of organic matter is destroyed; it will also soon disappear in the next to it. I will add to these latter jars successive measures of permanganate, and record, by counters placed against the jars, the number of measures which we thus introduce as the colour disappears. In the following table you have the total actual quantities, together with those estimated in this way of operating with known quantities of organic matter:—

	Amount actually contained.	Amount estimated by Permanganate.
Gum arabic	3 grains	·082 grains
Cane sugar	3 „	·051 „
Starch	3 „	·114 „
Gelatine	3 „	·634 „
Creatine	3 „	·064 „
Alcohol	3 „	·074 „
Urea	3 „	·074 „
Oxalic acid	3 „	2·998 „
Nitrite of soda	0 „	5·530 „

Oxalic acid, therefore, which is never present in potable water, alone yields an accurate result. I have no doubt you are watching the process going on in these jars, and will observe by the counters that I have already introduced ten measures of permanganate into the water, which contains no organic matter, nevertheless the colour continues to disappear.

For some months past, in conjunction with my pupil, Mr. Armstrong, who has afforded me very valuable assistance in this investigation, I have been endeavouring to remedy this grave defect in the mode of determining the amount of organic matter in water and we have at last succeeded in replacing this uncertain system by a process which gives us a definite determination, and which throws considerable light upon the present condition and previous history of the sample of water, submitted to analysis.

The two most important things to ascertain in reference to water for domestic purposes are—first, the amount of organic matter present in it; and, secondly, the amount of hardening or soap-destroying material. Unfortunately the first cannot be ascertained. There is no known process by which the quantity of organic matter in any water can be estimated. But we have succeeded in estimating the two chief elements in this organic matter—viz., carbon and nitrogen. Time would fail me if I were to go minutely into the process by which these determinations are made, but I may just mention that the carbon contained in the organic matter is

determined by the simple process of organic analysis with which chemists are familiar; we now ascertain the total combined nitrogen in the water; then the nitrogen of the nitrates and nitrites separately; finally, the nitrogen in the condition of ammonia, and from these numbers deduce the nitrogen contained in the organic matter in the water.

From these results we are able to calculate or determine two very important points with regard to the water. In the first place, we are able to ascertain with close approximation the amount of sewage, or other noxious matter of that character, with which the water has been in contact from the moment it descended to the earth in the form of rain to the time when it is submitted to analysis, although most or even the whole of this matter may have been oxidized by the flowing of the water down the stream. The next important point, and the one in which we take the most interest, is the determination of the nitrogen contained in the organic matter of the water. That is obtained by subtracting the nitrogen of the nitrites and the nitrates, *plus* the nitrogen in the ammonia, from the total combined nitrogen, and a very remarkable and exceedingly satisfactory result comes out from these experiments—viz., that in no water supplied to London is there any detectable quantity of actual or present sewage contamination. We know that the sewage of towns containing 600,000 inhabitants flows into the Thames above the source of the metropolitan water supply, yet all appears to be oxidized, and rendered innocuous before it reaches the spot where the water is taken out of the river by the various companies. This, as I have said, is a very satisfactory result to arrive at; but it is a thing which must be continually examined, and it will require many months investigation to convince us that none of this nitrogenous matter ever reaches the mains of the companies who supply London with water. On inspecting the following table, you will in some cases find indications of organic nitrogen, but they are so slight as to be always within the errors of experiment. So long, however, as these indications are there, they are a source of anxiety, and we therefore determined to investigate the matter more closely. We took a much larger quantity of water, in one case—viz., the Grand Junction—no less than ten litres (more than two gallons), and evaporated it down in a capsule, and if there had been a nitrogenous organic compound equal to the admixture, of 1-10th per cent. of average London sewage in the water, we ought to have detected it by operating upon this large quantity. The result of the experiment, which we only arrived at this afternoon, shows that the water is free from this small per centage of present sewage contamination.

Now one word about the column in the table given below, and headed "Previous sewage contamination." After an admixture with river or spring water, these organic sewage matters, with which our streams are liable to become contaminated, undergo slow oxidation, by which they are more or less completely resolved into comparatively innocuous inorganic compounds. Two of these—viz., carbonic acid and oxygen, mix with the waters of the streams, and are no longer recognizable. But, fortunately, there is a kind of skeleton of the sewage matter in the water, which is nitrogen, in the condition of nitrites, nitrates, and of ammonia, and this nitrogen writes, as it were, the history of the water in which it is present, and shows the extent to which it has been contaminated. That is the meaning of the column headed, "Previous sewage contamination." From the result of this calculation, it appears that 100,000 parts, for instance, of Chelsea water had been contaminated in February with average London sewage, or its equivalent, to the extent of 2420 parts. Fortunately this had been all destroyed by oxidization before it arrived at our supply-pipes, and such appears to be the case also with other Thames waters.

In the calculation of the previous sewage contamination of water it is necessary to allow for the amount of combined nitrogen in rain water; because rain water contains a little ammonia, some nitrite of ammonia, and sometimes traces of nitrate. Fortunately, the amount of these substances in rain water has been determined with great care by Messrs. Lawes and Gilbert, on the one hand, and by Professor Way, on the other, in a series of observations extending over two years, the results of which experiments agree closely. It appears that in rain water the proportion of combined nitrogen is ·0985 in 100,000 parts. This corresponds to a previous sewage contamination, equal to 985 parts of average London sewage in 100,000 parts of water, and must be deducted from the number expressing the previous sewage contamination of the water. This allowance is, no doubt, too great; however, it errs on the charitable side, as regards these waters. But that it is ample I think will be evident, first, from the consideration that about three-fourths of the total nitrogen in rain water is contained in that water as ammonia; and it has been shown by Professor Way that ammonia, when passed over or through cultivated soil, is absorbed, so that very little gets into a river like the Thames. That it is ample is also manifest by the amount of nitrogen in the form of ammonia and of nitrites and nitrates in the Loch Katrine water. This amount is so much less than that which we assume to be contained in rain, that it would be necessary to add to 100,000 parts of Loch Katrine water the oxidized products of 575 parts of London sewage, to reduce the purity of that water down to the standard with which we now compare the London waters.

Now we have a final column in the table which is denoted by the word "Hardness." This shows the amount of soap-destroying materials in the water. These hardening ingredients consist entirely of the salts of lime and magnesia; and, in the water supplied to London, carbonate of lime or chalk is almost the exclusive ingredient. It is brought into solution by the action of free carbonic acid, which causes the water to dissolve a very much larger quantity than it could otherwise do. We have here a vessel which contains a quantity of lime water, and if we pass carbonic acid through the lime water we shall get a copious white precipitate of chalk, but this will be redissolved by the further action of the same gas. The difference between hard water and soft is very remarkable when used for washing purposes. If you wash your hands in soft water you experience a pleasant sensation from the detergent action, whilst the contrary is the case if you use hard water; and you can at once, on going into a town, see whether the district is supplied with hard or soft water, by observing how the inhabitants wash their hands. If the water be soft, they wash their hands in the water, but if it be hard, they find it necessary to first moisten the hands in the water, and then to take them out in order to produce a lather with the soap. The water, in fact, decomposes the soap and produces an insoluble stearate of lime, which is thus precipitated in the pores of the skin and in the water round it. In washing with hard water, you actually stop up the pores of the skin with this greasy stearate of lime; I leave others to decide whether this be a healthy practice or not.

If you examine the column headed "Hardness" in the following table, you will find the proportion of hardness in London water expressed in degrees, each of which is equal to 1 part of carbonate of lime, or its equivalent, in 100,000 parts of water for the months of February and March; and you have the opportunity, in the table before referred to, of comparing the quality of the London waters in this respect, with that of the supply to Glasgow from Loch Katrine. In the former, the degrees of hardness range from 16·0 to 23·1, whereas, in the latter, the hardness is represented by the figures 0·3.

These methods of analysis have been employed for two months upon the metropolitan waters, with the results given in the following table:—

Quality of Water supplied to the Metropolis during the Months of February and March, 1867.

1. Name of Company.	2. Organic Carbon.		3. Nitrogen as Nitrates & Nitrites.		4. Ammonia.		5. Total combined Nitrogen.		6. Previous Sewage Contamination.		7. Hardness.	
	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.	Feb.	Mar.
Thames Companies.												
Chelsea	·433	·185	·337	·352	·004	·004	·371	·355	2420	2565	16·2	18·3
West Middlesex	·340	·245	·356	·313	·006	·008	·412	·319	2630	2205	16·2	18·9
Southwark and Vauxhall	·293	·256	·357	·344	·005	·005	·361	·348	2630	2495	16·8	19·1
Grand Junction	·417	·311	·322	·345	·004	·004	·325	·348	2270	2495	17·1	19·4
Lambeth	·423	·289	·341	·341	·005	·008	·356	·347	2470	2485	16·0	18·5
Other Sources.												
New River	·272	·284	·350	·332	·003	·004	·396	·335	2540	2365	18·5	16·8
East London	·293	·270	·357	·320	·004	·004	·392	·323	2620	2245	18·8	18·3
Kent	·088	·114	·421	·417	·008	·004	·428	·420	3300	3215	23·1	23·0
South Essex	·143	·185	·844	·815	·007	·005	·850	·855	7520	7565	21·1	21·4
Water from Loch Katrine, as supplied in Glasgow	·256	..	·031	..	·002	..	·041	..	0	..	0·3	—

The numbers in the table all refer to 100,000 parts of the waters. Column No. 2 shows the amount of carbon present in the organic matter of the water. Column No. 3 gives the amount of nitrogen in the form of salts of nitrous and nitric acids. Column No. 4 expresses the quantity of ammonia present in 100,000 parts of each sample. Column No. 5 records the total amount of nitrogen in the several forms of nitrogenous organic matter, salts of nitric and nitrous acids, and ammonia; whilst column No. 6 exhibits the previous sewage contamination estimated as above described. Finally, column No. 7 shows the hardness of each water as estimated by the soap-test—that is, the number of parts of carbonate of lime, or its equivalent of other hardening salts, contained in 100,000 parts of the water. As an example of the mode of reading the table, we may take the New River Company's water, 100,000 lbs. of which contained in the month of March last ·284 lb. of carbon and ·332 lb. of nitrogen, in the shape of nitrates and nitrites, besides ·004 lb. of ammonia, whilst the total amount of combined nitrogen in every form was found to be ·335 lb. The above quantity of water had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 2365 lbs. of average London sewage. By gradual oxidation, partly in the pores of the soil, partly in the river Lea and the New River, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been entirely converted into comparatively innocuous inorganic compounds before its delivery to consumers. Finally, 100,000 lbs. of the said water contained 16·8 lbs. of carbonate of lime, or their equivalent of other hardening ingredients.

For the purpose of comparison, I have also appended to the above table the results yielded by Loch Katrine water, as delivered in Glasgow, when submitted to the same analytical processes. A glance at the table will show how vastly superior in all respects is the quality of this water as compared with the best at present supplied to London: 100,000 lbs. of this water contain but 3·28 lbs. of solid impurity; it has no sewage contamination, previous or present; and it has only 0·3° of hardness.

Time permits only of a glance at the amelioration which it is possible to effect in the waters with which we are at present supplied. Seven years must elapse before we can possibly be supplied from any fresh source,

and it is, therefore, an important question how to obviate, as far as possible, the risks we now run from the impurities to be found in a river supply of water. In the first place, the organic matter contained in the water may be reduced by filtration through animal charcoal. I find that water will readily pass through a thickness of 3 feet of this material, at the rate of 41,472 gallons per square foot per diem, the organic matter being thereby reduced to one-half its previous quantity. To filter the whole of the water supplied to London 500 tons of animal charcoal would be necessary, at a cost of £13 per ton, or a total of £6500. This charcoal would require to be heated to redness for an hour or two every six months, and it would last for two years. It would then be worth nearly half its original cost as manure.

In the second place, the water ought to be supplied constantly, and not intermittently. So long as the inhabitants of London have to store water in their houses, situated as cisterns usually are, it will be unfit for domestic purposes. I do not see why the companies should not furnish us with a constant supply, as is done in Manchester and most other large towns. There the inhabitants have day and night a constant supply, which is very much to be preferred to the system adopted here of turning the water on for a few minutes once a day, and not at all on Sundays. It would be desirable that these ameliorations should be carried out at once, but they ought not to delay the introduction of an altogether improved supply free from all sewage contamination. Such a supply would be an inestimable boon to the community, and might be expected to banish epidemic cholera for ever from the capital of this country.

MALTA AND MEDITERRANEAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of the Shareholders of this Company was held at the London Tavern, Bishopsgate Street, on Wednesday, June 5—W. Nicol, Esq., in the chair.

The Secretary (Mr. E. P. Rowsell) read the notice convening the meeting, after which the following report and statements of accounts were presented.

In their present report the directors have the pleasure of pointing to the improvement which has taken place in the position of the company during the past year, and of congratulating the shareholders upon the steady progress made in developing the soundness of their undertaking, affording as it does a clear prospect of that success to which they have always looked forward.

The directors recommend the declaration of a dividend, for the year ending the 31st of March last, of 7 per cent. on the preference shares (the amount to the 30th of September, 1866, having been already paid on account), and of 4 per cent. on the ordinary shares, being an increase on the latter of 1½ per cent. over the dividend for 1865, and 1 per cent. above that of 1866. The improvement is more observable when it is remembered that this year, for the first time, the shares hitherto known as "deferred shares," amounting to £14,000, partake of the dividend.

The following tabular statement shows the increase in the number of lights at the three stations in work on the 31st of March last:—

	1864–5.	1865–6.	1866–7.
Valetta	4082	4774	5556
Calcara	—	1652	2598
Corfu	—	536	1102

The shareholders will remember that the works at Valetta (the capital of Malta) were purchased by the company, and have now, therefore, been several years established. The returns from them continue to be highly satisfactory.

The Calcara station comprises the three cities on the opposite side of the Great Harbour from Valetta. The population is nearly the same as at Valetta, and in all probability the returns from the two stations will ultimately be about equal.

For details of these works the directors refer to the engineer's report appended, merely mentioning here two points of much importance—namely the signing of a new street-lighting contract for Valetta and Calcara for 15 years, and a requirement of 250 additional public lamps, the effect of which will be very marked in future accounts.

The anxiety which the unexpected change of Government at Corfu naturally occasioned as to the future of that station is subsiding, and the directors see no reason to doubt its prosperity. It will be seen that the number of lights has greatly increased, and the reports of the manager are very encouraging.

Lighting has been commenced with good prospects, both at Trapani and Marsala. At Trapani 100, and at Marsala 50 additional public lamps have been demanded beyond the number required by the concessions.

The directors ask the particular attention of the shareholders to the financial condition of the company.

The sum of £30,000 voted for the Trapani and Marsala works but little more than covered the amount required for the contractors. As stated above, additional lamps have already been required at both stations, and the 100 demanded for Trapani are now being placed, and the mains extended accordingly. Besides this extra expenditure, an outlay is needed for fittings, for working capital, and various incidental payments, and thus the wants at these two stations represent about £12,000.

At the other stations of the company money is likewise needed for extension of mains and various charges connected with increased lighting, and the total amount needed on all accounts, including the above £12,000, is fully £20,000.

The directors have given much thought to the subject of these requirements, and see that they are unavoidable, and that the money so laid out, or to be laid out, will certainly produce a profitable return.

The shareholders have had notice of a series of resolutions which will be proposed to the extraordinary meeting. All the resolutions (with the exception of Nos. 6 and 7) concern the company as it stands, and have for their object the placing it, financially, on a sounder footing, by providing (besides the above demands) for the gradual extinction of the debenture debt.

With reference to a proposed extension of the company, by undertaking the lighting of the city of Bari, in Italy, notice has been given of resolutions Nos. 6 and 7, so that if the extraordinary meeting should approve such extension, it may be formally sanctioned and proceeded with. The engineer's report on Bari is appended.

Two directors—namely, Robinson Duckworth, Esq., and Francis Edwards, Esq.—retire by rotation, and, being eligible, offer themselves for re-election.

The auditors, Henry M'L. Backler, Esq., and James Le Geyt Daniell, Esq., likewise retire, and, being eligible, also offer themselves for re-election.

Dr. *General Balance-Sheet, March* 31, 1867. *Cr.*

To Capital—				By Preliminary expenses		£1,614 14 3
£5 per sh. on 12,000 ordinary shares.	£60,000 0 0			Outlay—		
£5 per share on 6000 preference shares .	£30,000 0 0			No. 1 station	£36,650 3 9	
Less arrears	480 0 0			No. 2 „	21,583 8 5	
	29,520 0 0			No. 3 „	17,117 6 7	
		£89,520 0 0		No. 4 „	16 939 11 2	
Loans on debentures		25,850 0 0		No. 5 „	12,821 3 3	
Bills payable		3,371 17 0				105,111 13 2
Sundry creditors		8,987 5 4		Extending mains and erecting additional public lamps at Valetta and Calcara during the 12 months		1,880 16 10
Reserve-fund		605 18 9		Sundry accounts		2,489 3 11
General revenue account	£3,879 1 4			Ditto debtors		3,397 16 0
Less dividend on preference shares already paid on account	527 2 7			Bills receivable		3,211 15 6
		3,351 18 9		Goods *in transitu*	£ 496 18 9	
				Stocks	12,817 17 7	
						13,314 6 4
				Cash		666 13 10
		£131,686 19 10				£131,686 19 10

Dr. *Profit and Loss, March* 31, 1867. *Cr.*

To Coal	£4,253 6 1			By Gas	£10,793 8 10	
Gas-making—wages	834 4 0			Coke	1,382 3 3	
Gaslights—salaries	435 16 3			Tar	41 11 4	
Charges on street lights	370 0 11			Meters	85 13 9	
Lime and purifying materials	101 17 4			Rental of meters	259 13 9	
Wear and tear	945 10 3			Stock	122 18 0	
Rents	38 16 4			Rents	28 14 7	
Treasurer's commission at the stations	128 3 0					£12,714 3 6
Bad debts	31 17 7			Profit on fittings		402 4 11
General expenses	566 13 11			Transfer fees		3 14 6
		£ 7,706 5 8				
London expenses	£ 978 16 0					
Less carried to Trapani and Marsala account	100 0 0					
	£878 16 0					
Broker's commission	22 0 0					
Exchange	123 17 6					
		1,024 13 6				
Interest and discounts	£ 144 11 1					
Ditto on calls in advance	58 4 1					
Ditto on debentures	307 7 3					
		510 2 5				
General revenue account for dividend		3,879 1 4				
		£13,120 2 11				£13,120 2 11

Dr. *General Revenue Account.* *Cr.*

To Dividend on preference shares, to Sept. 30, 1866, paid on account of the year		£ 527 2 7		By Profit and loss	£3,879 1 4
Balance thus divisible—					
Required to complete dividend on preference shares for the year	£ 937 12 4				
Required to pay 4 per cent. on ordinary capital	2,400 0 0				
	£3,337 12 4				
Surplus	14 6 5				
		3,351 18 9			
		£3,879 1 4			£3,879 1 4

The Chairman, in moving the adoption of the report, said he hoped the shareholders would agree with the directors in thinking that the progress of the company during the past year was satisfactory. The addition to the dividend on the present occasion was 1 per cent. upon that declared last year, and 1½ per cent. over that of the previous year. The working at the different stations of the company had been so far satisfactory that the directors thought they saw their way to a further increase in the dividend when they should have the pleasure to meet the shareholders again, and he ventured to hope that the progress of the company would not stop there. To show the advance they were making, he might state that not only were they able to make this addition to their dividend, but they had cleared off several charges which were not in the previous year's account. The balance of profit and loss at March, 1866, was £1782 9s. 11d.; at March, 1867, it was £3879 1s. 4d., showing a difference in round numbers of something like £2000 in favour of the last year. The additional lights the company had received during the last two years were shown in the report, but it was not there shown what were the receipts and profits from that source. The receipts from 1865 to 1866 were £7341 10s.; from 1866 to 1867 they were £7869 19s. 3d., so that

there was here a moderate improvement, amounting in round numbers to £500. This was so far satisfactory, but the directors looked forward to a much greater advance in the current year, in the receipts from the public street lighting, the dockyards, and public buildings; and, if they could provide the necessary capital, from the lighting of the head of the Great Harbour. At the Calcara station, which comprised the three cities on the opposite side of the Great Harbour, the receipts for 1865 were £1403 5s. 5d.; last year they were £2877 17s. 8d., or more than double those of the previous year. But that part of the undertaking, as well as the works at Corfu, was still in a very undeveloped condition; the capital had been expended upon them, but there had been hardly time to realize the fruits of the investment, and they had only as yet the earnest of what the returns would be. At Corfu the receipts for 1865 were £1287 5s.; last year they were £1969 2s. 2d., an increase far beyond what the directors anticipated. The result of the working of the different stations was as follows:—At Valetta the profits in 1865 were £2978 19s. 8d.; last year they were £3528 5s. 5d. At Calcara, in 1865, the profits were £496 5s. 8d.; last year they were £1142 18s. 10d.; and at Corfu the profits in 1865 were £292; last year they were £530 7s. 9d.; so that he thought he was justified in stating that the progress at all the stations was very encouraging. The profit on "fittings" was somewhat less than it had been, arising from the policy adopted by the directors of charging only a small per centage upon their cost, with the view of stimulating the extended use of gas lighting. The proprietors were aware that at first the lighting of private dwellings in Malta with gas was very slow. Many persons were adverse to adopt it from the fear of explosions, but he was happy to state that the prejudices against its use were wearing off, and there was good reason to hope the use of gas for domestic purposes would be rapidly and largely extended. Nothing could be said at present about Trapani and Marsala, beyond the fact that lighting had been satisfactorily commenced, that additional public lamps had been required, and that the directors had every reason to believe those two new undertakings would be profitable to the company. The directors had received a most satisfactory letter from their agent at Valetta, giving a very interesting account of the present position of things at Malta, and of the prospects of the undertaking. The letter was too lengthy to read, and, therefore, he would content himself with thus alluding to it. The principal thing the shareholders had now to consider was the question of additional capital. It was quite certain that this concern was begun with insufficient capital, and the consequence was the directors had been put to all kinds of shifts to carry on their operations. He thought the times were now more favourable for placing themselves in a better position with reference to the existing works. The shareholders had received an intimation that a proposal was to be laid before them at this meeting for lighting Bari with gas, but it was not in reference to that he now spoke of the necessity for more capital. The directors required, as stated in the report, about £20,000 to put their present stations in a proper condition. They were also anxious to place themselves in a position to reduce debentures which had already been issued, to the extent of £30,000; so that in reality they found it necessary to ask for an additional capital of £50,000. They did not propose to raise the money for paying off the debentures at the present moment, but they asked to be empowered to raise it so as to be prepared, as the debentures fell in, to meet them.

The SECRETARY said the bulk of the debentures would fall due in about three and a half years time.

Mr. SLOUS said, presuming that the adoption of the report did not commit the shareholders to the Bari scheme, he saw but little to disagree with in the motion. At the same time he was bound to remark that the financial position of the company appeared to be most melancholy, and though the chairman had spoken very cheeringly of the working of the company, he did not believe the directors had a chance of raising the money they required except at an enormous sacrifice. The Malta Gas Company was like a strong man smitten down with a mortal disease. It was labouring under the malady called "extensions," which was eating its life out of it. Had the directors had nothing to do with the two paltry concessions of Trapani and Marsala, they would now have been in a comfortable financial position. At all events, they would not have needed the £12,000 for which they were now about to ask, and would easily have procured the £8000 necessary for their original undertaking. He had not a word to say about any further extensions, because, as yet, no proposition of the kind was before the meeting; and he earnestly hoped that the directors remembering what had been the result of past operations in that direction, would change their minds, and not press the Bari scheme upon the meeting.

The CHAIRMAN said the Trapani and Marsala undertakings had as yet cost the company nothing beyond the contract price.

Mr. SLOUS: But you now want £12,000 for them.

Mr. LYSLEY said when the Trapani and Marsala extensions took place he was abroad, and he heard of the scheme with considerable amazement. He thought the meeting ought to know something more about them; at present they had no knowledge of the sum paid for those works.

A PROPRIETOR: It is stated in the report, £30,000.

Mr. LYSLEY would like to know something about the capabilities of these works, and what the rental from the private lights was likely to be. As a director of a large metropolitan company, he was aware that gas companies could not reckon upon much, if any, profit from the public lamps. He had lived for some years in Malta, and thought it was much to be regretted that the operations of this company were not confined to that place. The difficulties of management were increased by the addition of Trapani and Marsala, and the profits of the company were wasted in carrying on those works. The populations were too poor to need gaslights, and he did not believe the directors would readily find a man they could trust to carry on the works.

The CHAIRMAN said this time last year, when the shareholders met, the extensions to Trapani and Marsala were discussed and adopted, with one or two dissentients.

Mr. LYSLEY said that was because many large shareholders were absent.

The CHAIRMAN said the number of public lamps required by the concession for Trapani and Marsala was 300; but before the place was lighted up the company had received demands for 150 more, and Mr. Hodgson Jones would tell the meeting that the applications for private lights were considerable. The directors did not anticipate any loss, but a large return from these stations, especially from Trapani. Up to the present time they had cost the company nothing, and the dividends of the shareholders had not been in the slightest degree affected.

Mr. DODSON remarked that but for these places the capital would have been £30,000 less, and therefore the rate of dividend would have been larger.

The CHAIRMAN said the capital had cost them nothing at present, and they got interest for the year in the contract price.

Mr. DODSON: Still it is added to capital in some shape or other.

The CHAIRMAN: It was part of the contract arrangement, but I think it is hardly necessary to go over that now, because it was all agreed to last year. I believe we have as good a contract there as anywhere, and I have not the least doubt it will yield a good return.

Mr. H. P. STEPHENSON felt sure, from what he had heard of Trapani and Marsala, that they were good sound concessions, and likely to be profitable to the company. In fact, he was quite sure that their engineer would not have recommended them unless they were likely to be advantageous, and so far he (Mr. Stephenson) disagreed from the last speaker. But he agreed with the previous speakers that the company were embarking in a field of over-trading by extending their operations into a large number of small towns, instead of thoroughly developing their resources in the larger towns which already belonged to them. His observations would be more especially applicable to the proposed extension to Bari, when that question came before the meeting. He must be allowed to differ with the chairman as to the effect of the Trapani and Marsala concessions upon the dividends of the shareholders. It must be remembered that the contractors for those works took payment in 7 per cent. preference shares.

The CHAIRMAN: No, no.

The SECRETARY: They are paid entirely in 6 per cent. debentures.

Mr. STEPHENSON: Then who took the preference shares?

The SECRETARY: The contractors took the preference shares totally independent of the contract, and they paid for them.

Mr. STEPHENSON: My argument would still be the same, for if the contract had not been entered into it would not have been necessary to saddle the company with so large an amount of 7 per cent. preference shares, and then the ordinary shareholders, of whom I am one, would have had a larger rate of dividend.

The CHAIRMAN: Excuse me, you are quite mistaken as regards the 7 per cent. preference shares. They were authorized to be issued for payments at Malta and Corfu, and we found it impossible to issue them. They were then taken by the contractors for Trapani and Marsala as part of their payment.

Mr. STEPHENSON: I stated that just now, and I was contradicted.

The SECRETARY: The contractors came to me first of all, and proposed that we should undertake the lighting of the two places. My reply was that it would be impossible, as we were already in money difficulties; that we were seriously in debt, and wanted £12,000, without which we could not get on; and I did not see what would become of the company if that sum were not raised immediately. They thereupon considered their offer, and came forward to execute the whole of the works, receiving payment in debentures; and, as an inducement to the company to accept their offer, they said we will relieve you of the whole of the preference shares you have in hand, which was an advantage altogether outside the contract.

Mr. DODSON said his reading of the matter was that if the company had not been encumbered with these preference shares the ordinary shares would now be dividing 7 per cent. The result of the working at No. 1 station was 10 per cent., at No. 2 station 5 per cent., and at No. 3 station 3 per cent., which gave an average of 7 per cent., setting aside the other stations. He had always contended that all capital required for new stations should be raised separately, and not thrown upon the general undertaking.

Mr. EDGCOMBE said that even if this year the dividend was not affected by Trapani and Marsala it would necessarily be next year. It seemed to him that they had entered into those schemes to get themselves out of a difficulty at the time, and the effect had been to saddle themselves with the much greater difficulties they had now to contend with.

The SECRETARY stated that the company would receive from the contractors 4 per cent. in part of the 6 per cent. which was to be paid to them for the current year, so that, unless the Trapani and Marsala works failed to raise 2 per cent. interest, there could be no loss at all.

Mr. KING said this discussion might have been opportune last year, but it was now altogether out of place. The company had adopted those extensions, and were now fully committed to them. It should be borne in mind that the London expenses of a foreign gas company were a very serious matter when the works conducted by them were only upon a small scale, and the only way to evolve the maximum of profit was to distribute those expenses over a large surface, as was done in the European Gas Company and the Imperial Continental Gas Association. The latter company had sustained a very considerable loss at Marseilles, but it was not felt by the shareholders, because it was distributed over 14 or 16 stations.

Mr. DODSON said the policy of the Imperial Continental Gas Association was that which he had been advocating. They raised separate capitals for their different works, and those capitals were not consolidated until these works became productive. If that course had been followed here, the Malta shares would be at a considerable premium.

After some further conversation the motion for the adoption of the report was put and carried.

The CHAIRMAN then moved that a dividend at the rate of 7 per cent. be declared on the preference shares for the twelve months ending the 31st of March last, deducting the payment already made on account, and a dividend of 4 per cent. be declared upon the ordinary capital of the company, payable on the 19th inst. In answer to Mr. Stephenson, he stated that the dividends would not be free of income-tax.

Mr. RHODES seconded the motion, which was put and carried.

The retiring director, Mr. Duckworth, was re-elected.

On the motion to re-elect Mr. Francis Edwards, another retiring director,

Mr. KING rose to object to the appointment, which he submitted could not be to the advantage of the company. He referred to Mr. Edwards's connexion with the Humber Iron Company, the Contract Corporation, and Smith, Knight, and Co., Limited, in all of which undertakings he (Mr. King) had been a sufferer. He spoke also of Mr. Edwards's connexion with the Continental Gas and Water Company, and of other circumstances which he thought made it undesirable to re-elect him on the board of the Malta Gas Company. He inquired how often Mr. Edwards had attended the board meetings of this company.

The CHAIRMAN doubted whether the inquiry was in order, but said there was not the slightest reason for withholding the information. Mr. Edwards had been a very bad attendant; he had, probably, not been at the board six times during the year.

Mr. KING then moved an amendment to exclude Mr. Edwards from the direction.

After some conversation on the terms of the amendment, Mr. King consented to modify them as follows:—"That Mr. Francis Edwards be not re-elected a director of this company."

Mr. SLOUS seconded the amendment, which was put and carried unanimously.

The retiring auditors, Messrs. Backler and Daniell, were re-elected, and their remuneration fixed at twenty guineas each.

The meeting was then made special for the purpose of increasing the capital of the company, exercising its borrowing powers, authorizing the purchase of a concession, contract, land, and works for lighting Bari, in

Italy, and altering the Articles of Association of the company according to notice given.

The CHAIRMAN moved a formal resolution to the effect that, subject to the preference capital of the company, the present ordinary capital of the company be increased from £60,000 to £100,000, by the creation of 10,000 new ordinary shares of £5 each, to be issued at par and first offered to the existing shareholders; that £1 per share be paid upon application, and that the shares not applied for by the existing shareholders be issued in such manner as the directors in their discretion may determine. He stated that this additional capital was required, quite irrespective of the Bari concession.

The SECRETARY said £20,000 was needed for the existing works; the remainder of the £50,000 the directors asked power to raise for the purpose of paying off debentures as they fell due.

A long discussion arose upon this proposition, the shareholders generally expressing themselves opposed to the creation, in the present state of the company, of more capital than was absolutely needed to carry on existing undertakings.

The CHAIRMAN said the £30,000 for redemption of debentures might stand over, but with less than £20,000 for the current needs of the company he would not undertake to carry on the concern.

Mr. HODGSON JONES, the company's engineer, said they had lately entered into a contract at Valetta for an increase of the public lights. After a treaty of three years duration the contract had been signed, and the Government were now anxious for the lighting to be commenced. They also wished to light up a considerable district which was not contemplated at the time of the establishment of the company. The British Government having taken the Dockyard Creek, the traffic of Valetta and the three cities had been forced to the Great Harbour, and a new town had sprung up there. The extension of the public lighting in that direction must necessarily take place, and he had no doubt it would be found profitable to the company. The existing works were quite sufficient for that purpose, but an outlay of £4000 or £5000 was necessary for mains. Additional capital was called for at Trapani for the 100 extra public lamps, and at Marsala for 50 extra. The company were also fixing 250 extra public lights at Malta. In answer to Mr. Lysley, the engineer stated that to supply the district he had referred to it would be necessary to lay about four miles of independent main direct from the works.

The directors having assented to limit the additional capital to £20,000, a long discussion ensued as to the terms upon which the new shares should be issued. Some amendments were made, canvassed, and withdrawn, and ultimately the original motion was modified to the effect that £20,000 should be raised by the creation of 4000 new £5 shares, to be issued at par; and that any of such shares not applied for by the existing shareholders should be dealt with in the discretion of the directors, and might be issued by them from time to time at such prices as they might determine; but if offered on any other terms such offer should, in the first instance, be made to the present shareholders.

The next proposition, which was to authorize the directors to issue fresh debentures, gave rise to a long conversation, which terminated in the adoption of the following resolution:—"That in the event of the non-issue, in whole or in part, of the ordinary shares authorized by the last resolution, by a date to be fixed by the directors, they be authorized to issue debentures to the extent of £20,000, including the amount received by the issue of the said 4000 shares."

The CHAIRMAN said they now came to the proposition for lighting the city of Bari, and the meeting must understand that this was not a proposition which had emanated from the board of directors. It was proposed to them through their engineer, Mr. Hodgson Jones, by a party who had now nearly completed the works there. The board had given no opinion on the subject further than to say that they thought favourably of it, but could do nothing till they had submitted it to the shareholders, who had now had the opportunity of reading Mr. Jones's report on the subject.

Mr. STEPHENSON asked whether the board recommended the adoption of the proposal, and if they did whether they held sufficient proxies to carry it, because if so the shareholders present might save their time by not entering into any discussion upon it.

The CHAIRMAN said proxies had been sent in, but they were not held by the board, nor did the board take any active part in the matter, further than to determine that if the necessary capital were raised they would be willing to undertake it.

Mr. STEPHENSON inquired further whether the board had considered the financial question, and whether they saw their way clear to raise the capital.

The CHAIRMAN replied that they did not at present.

Mr. LYSLEY submitted that the company were not justified in undertaking a scheme of this magnitude, which if unsuccessful would swamp the whole concern. The proposition ought to emanate not from the engineer, but from the board, and be submitted to the shareholders on their responsibility. At present the meeting had nothing to guide them except the engineer's report and a plan of what was presumed to be the town of Bari. He would ask whether that plan was prepared by the engineer himself?

Mr. HODGSON JONES: Yes, I am responsible for it.

Mr. LYSLEY: Will you put your name to it as an accurate plan?

Mr. HODGSON JONES: I will.

Mr. LYSLEY: And that all the red parts are built upon?

Mr. HODGSON JONES: No; if you will look in the margin you will see that that is the new town in construction, as sanctioned by royal decree.

Mr. LYSLEY said he did not want to have pictures of the place, as he knew what Bari was. He wanted to know who was responsible for the map.

Mr. JONES: I am.

Mr. LYSLEY: Then I shall be glad if Mr. Jones will state whether the part marked red is built upon or not.

Mr. JONES: I did not make such a statement, and if you will take the trouble to to read the index at the side, you will see that the part marked red is not built upon; it is in construction.

Mr. LYSLEY: No doubt it is in construction; we know many things may be authorized which are never finished.

Mr. JONES: I say, in my report, that it may be 15 years before this part is completed.

Mr. LYSLEY: This proposition appears to me to be one of the most monstrous I have ever heard. The greater part of our time to-day has been engaged in supplying the financial deficiencies of the company? And why? If we had been content with Malta we should have had no want of money or dividends. I was unfortunetely abroad, and could take no part in the proceedings twelve months ago when Trapani and Marsala were started upon us. There is no conclusive evidence of what has been done in that matter, and it may be one of those extensions which tends to the ruin of the company on which it is grafted. And now we have another plan started, upon no other evidence than that of our engineer. I do not say a word against him, but rumours have reached me that he is part owner of the thing he is offering to us.

Mr. HODGSON JONES: No; I should be sorry to bring forward a proposition in a company by which I was engaged, in which I was to receive any payment directly or indirectly. My position in Bari, in the event of your not taking up the concession, will be improved, inasmuch as, instead of receiving debentures for the money I have invested as "caution," I shall, under the contract which I have signed with the other parties, get cash.

Mr. LYSLEY: We cannot enter into this.

Mr. HODGSON JONES: I think it fair that I should be allowed to explain that I have no interest in Bari at all in laying it before this company. It is simply from my friends having a large interest in the company that I was desirous of pushing it on to be prosperous, which I believe it will be eventually.

Mr. LYSLEY: I only want a direct answer, and I think you have given it, that you have no interest in it with Mr. Pritchard or otherwise.

Mr. HODGSON JONES: I have no interest in laying this matter before the company.

Mr. LYSLEY: That is not the question. I ask whether you have any interest in it?

Mr. HODGSON JONES: I have no interest in it. I am the concessionaire.

Mr. LYSLEY: Then how can you venture to say that you have no interest in it—our paid engineer?

Mr. SLOUS: It is simply abominable.

Mr. HODGSON JONES: I took the concession for the benefit of this company.

Mr. LYSLEY: I propose that this matter be adjourned till this day six months.

Mr. SLOUS: I move that this meeting be adjourned. We will not go into this question.

The SECRETARY: May I interpose for a moment, just to assure you that you are mistaken?

Mr. LYSLEY: I would rather that the directors spoke for themselves. I would rather hear any explanation from those who are responsible.

The SECRETARY: I only want to interfere to put you right. I am sure you would not be desirous to make a statement which is not correct. I am not sure that the chairman understands the question sufficiently to answer.

Mr. DODSON: The chairman ought to understand it.

The CHAIRMAN: I am unfortunately in feeble health, and feel scarcely equal to the task of being here to-day. But I will tell you in a few words the position of the company. This Bari affair is being carried out now by a gentleman whose name is Lambert, and he has, according to the statement given to you in the engineer's report, undertaken to take a certain number of shares paid up, amounting to £22,250, the whole extent of the contract being £37,957, and he proposed that £15,707 should be paid to him in debentures for three years, bearing interest at 6 per cent. per annum, or in cash at the option of the company. My answer to that was, and I think my colleagues agree with me, that if shares could be taken up to the extent of 35,000 shares, we would consent to the remaining £15,000 in debentures, but we must see our way clearly to the capital being raised before we undertook it. That is the way in which it stands as far as the board are concerned.

Mr. LYSLEY: We must see our way, not only as to the mode in which the capital is to be raised, but also as to whether it is worth while to raise capital at all for such a scheme. I believe, and I speak conscientiously as a not inconsiderable shareholder, when I say that I believe it to be a total delusion, and that years and years would elapse before this Bari scheme would be anything but an incubus upon the Malta Gas Company. The directors have not furnished us with any evidence, nor have they stated that they possess any information, except from Mr. Jones, who, by his own admission, is the concessionaire, though he denies that he has any interest in the thing.

Mr. HODGSON JONES: I have no interest in the thing except as the concessionaire.

Mr. LYSLEY: You the concessionaire and yet have no interest?

Mr. HODGSON JONES: Just so.

Mr. LYSLEY: You have an interest, because you wish to sell it to us.

The CHAIRMAN: Allow the paragraph respecting the contract between Mr. Lambert and Mr. Jones to be read.

Mr. SLOUS: We have nothing to do with that.

Mr. LAMBERT: From a personal visit to Bari I became persuaded, as a practical man, that it would not only add to the success of the Malta Gas Company, but perhaps would become the most important, or as important as any of the stations of the company. I was asked by Mr. Jones if I would undertake it. I said not until I saw the place. I visited the place, and came to the conclusion, from what I saw, that there would be a large consumption of gas, and that with a moderate capital, such as the provisional contract implies, there would be a very excellent return. That provisional contract was entered into in consequence of a resolution come to by your board. I should not have entered into it but for that. The resolution is dated the 24th of January.

Mr. DODSON: In whose writing is it?

Mr. LAMBERT: It is signed by Mr. Rowsell. It states that the subject of lighting the city of Bari was discussed at the meeting yesterday by the directors, in connexion with a letter from Mr. Jones, in which he stated that he believed he had arranged terms with the contractor—viz., two-thirds in ordinary shares, and one-third in debentures, and that the following resolution was passed:—"Resolved, that the board having considered the proposition for lighting Bari with gas, are favourably impressed with the same, and agree to bring it before the shareholders at their meeting in June next."

The CHAIRMAN: That is the only part the directors took in the matter.

Mr. LAMBERT: If you look at the terms of the contract, you can only charge me with temerity in accepting the work on such terms. I do not ask you for any money at all; before you are required to find any money the city will be lighted. Here is a city with 50,000 inhabitants, on the direct route to India, and will be the resting-place of travellers going there.

Mr. HODGSON JONES: I think it is only fair to me, as an old officer of the company—one who has served you faithfully, and had most responsible duties to perform—that it should not go forth from this room that I have in any way acted improperly in connexion with the Bari concession. I was very much struck with the town when I saw it, and in consequence I invested the money as "caution" to secure so good an opportunity of serving the company. I think it is extremely unjust that anything like an aspersion should be cast on my straightforwardness in the matter. I have no interest in it at all—I acted for the company; I had only this much interest, that I advanced the caution-money. That money was offered to be repaid to me, but I said if you took it up I should be willing to take it in debentures.

Mr. LYSLEY: Supposing we knew anything about Bari, except from those who are selling it, which we do not, I, for one, should have the greatest suspicion of the whole thing. It is to my knowledge in one of the most lawless districts of the Neapolitan kingdom. I do not find that the directors (who, though they affect indifference in the matter seem to have entertained the proposition), know what they propose to buy. In one paragraph in Mr.

Jones's report he says, "The iron-work and mains are now being shipped." What, gentlemen, are you buying? Are you buying buildings completed, or only in progress? If the thing existed as a substantive object which would bear valuation, it might be worth while to employ some disinterested person to go and report upon it. But as the matter now stands, I say boldly to you that you, as directors, are incurring the gravest responsibility in not taking part in the matter, and not informing us whether you consider it is a right or wrong thing. You have no right thus to throw a matter of this kind among the shareholders; it is not a fair mode of dealing with your constituents. I, for one, am so satisfied of the delusion of the whole thing, that at very stage of the business I will do my utmost to defeat it. I now propose that the meeting be adjourned for six months.

Mr. SLOUS: I beg to second that. Let it be *sine die*.

The CHAIRMAN: You may have to meet for other purposes.

Mr. EDGCOMBE supported the adjournment, because he thought it was not right for a company in difficulties to enter upon an unknown speculation. Without arguing whether or not this Bari scheme might be made to pay, as prudent and honourable men they ought not to entertain it. If the concession were a good thing, those who had obtained it could easily get up a company to carry it out, but he protested against it being thrust upon the Malta Company.

A PROPRIETOR said, after all the time that had elapsed since the formation of the company, they were only able to pay 4 per cent., and they might, by adopting the proposed extension, destroy the whole concern.

Mr. LAMBERT wished to say something respecting the value of the concession, but he was interrupted by

Mr. EDGCOMBE, who protested against Mr. Lambert, an interested party, trying to throw upon this company the onus of carrying out his contract. If he considered he had a good bargain, let him by all means keep it.

Mr. LAMBERT said, as a shareholder in the company, he had a right to speak.

Mr. SLOUS said whatever the facts of the case might be, the feeling of the shareholders was evidently against this concession being thrust down their throats, and he should have thought the directors would have seen the propriety of retiring from their present position. He hoped the adjournment *sine die* would be carried.

Mr. STEPHENSON said he was quite convinced, in his own mind, that this concession for Bari was a very good one, and if the company had cash at their bankers, and could make a cash contract for the works, they might do well with it. He had every confidence in the report of Mr. Hodgson Jones, and had no doubt that ultimately the undertaking would be successful. He believed, too, that the offer made by Mr. Lambert was an exceedingly liberal one—more so than he should have been prepared to make himself. But the meeting must bear this in mind—Mr. Lambert was a good man of business, and no doubt he had not agreed to take shares and debentures instead of cash without a reason; and quite right too. He most likely said to himself, "It will suit my purpose to take these shares and debentures at such and such a discount, because I can see my way to make it pay." But then the company, being in financial difficulties at present—certainly not in a sound position—must beware of entering upon a contract which, however good under other circumstances, was not requisite for their purposes, and would only hang a load of debt upon their necks which they would afterwards be glad to be rid of. Let them go on as they were, and develop the undertakings they had in hand, and when they were able to pay 5 or 6 per cent., if a new concession should appear desirable, call up fresh capital so as to carry it out for cash. Under existing circumstances it would be monstrous, and he thought suicidal, to take any steps in this matter. He had seen a great deal of general companies spotting themselves here and there over the world, and he had seen the embarrassment and suffering which frequently followed from these indiscreet extensions.

The CHAIRMAN thought it was wasting breath to run down the proposal any longer. All the arguments were on one side.

Mr. EDGCOMBE said he did not think so much would have been said if the shareholders had not seen the great bundle of proxies before the directors.

Mr. SLOUS said the question now before the meeting was that of an adjournment, and the directors could not use proxies for that purpose. It was a matter entirely *pro re natâ* and must be decided by the shareholders present.

Mr CROSSLEY wished it to be understood that there were no directors proxies.

Mr. SLOUS: They are somebody's proxies.

Mr. LYSLEY said he was the owner of 900 shares, which he had held all through the existence of the company, and he had never heard a word about proxies till he came to the meeting. Of course, if those who were favourable to the Bari scheme intended to use their proxies against the better judgment of the meeting, he could not help it.

A DIRECTOR said he had never heard anything about proxies till that moment.

Mr. CROSSLEY said proxies had never been sought by the directors.

Mr. EDGCOMBE doubted not that if he could get behind the scenes he should find that some one had been applying for them.

Mr. HODGSON JONES said he was quite willing to state that he held proxies.

Mr. EDGCOMBE: But you surely do not mean to use them? You are not fit to be the engineer of the company if you use these proxies in a case in which you are personally interested.

Mr. HODGSON JONES: I am not personally interested.

Mr. EDGCOMBE: I beg your pardon, you are the concessionaire.

The motion for adjournment was then put and carried unanimously.

On the motion of Mr. STEPHENSON, seconded by Mr. LYSLEY, a vote of thanks was given to the chairman and directors, and the proceedings terminated.

DR. FRANKLAND'S ANALYSIS OF THE METROPOLITAN WATERS IN MAY, 1867.—"Royal College of Chemistry, June 1, 1867.—Sir,—I have the honour to submit to you in the following table the results of the chemical examination of the waters supplied to the metropolis during the month of May. For the purpose of comparison, I append also the results yielded by Loch Katrine water, as supplied to Glasgow, when submitted to the same analytical processes:—

Companies.	Date and Place of Collection.	Total Solid Impurity in 100,000 Parts.	Organic Carbon.	Nitrogen, as Nitrates and Nitrites.	Ammonia.	Total combined Nitrogen.	Previous Sewage Contamination (Estimated).	Total Hardness.
Thames.								
Chelsea.....	May 1—Cab Rank, Horse Guards ...	29·34	·287	·199	·004	·231	1325	22·0
West Middlesex	May 1—Gt. Portland Street, W...	27·16	·231	·220	·004	·274	1755	20·8
Southwark & Vauxhall..	May 1— Barclay's Brewery	28·82	·260	·207	·006	·278	1795	20·8
Grand Junction.....	May 30—Cab Rank, S. Molton Street.	29·84	·278	·210	·005	·228	1295	21·4
Lambeth	May 1—Cab Rank, Westminster Rd.	29·64	·465	·184	·006	·227	1285	21·4
Other Sources								
New River ..	May 15—Cab Rank, Tottenham Ct. Rd.	24·68	·163	·205	·004	·285	1865	18·8
East London.	May 7—Old Ford Water-Works ...	26·86	·245	·161	·002	·190	915	20·0
Kent.....	May 14—Wr-Wks. Deptford.....	39·22	·254	·363	·002	·384	2855	28·0
Loch Katrine	Feb.—Glasgow ...	3·28	·256	·031	·002	·041	0	0·3
Column 1	2	3	4	5	6	7	8	9

The numbers in columns 3, 4, 5, 6, 7, 8, and 9 all relate to 100,000 parts of the waters. The table is to be read thus: 100,000 lbs. of Chelsea water collected, on the 1st of May, at the Horse Guards cab rank contained 29·34 lbs. of solid impurity; the organic matter, constituting a portion of this impurity contained ·287 lb. of carbon. This solid impurity also contained ·199 lb. of nitrogen in the form of nitrates and nitrites, besides ·004 lb. of ammonia; whilst the total amount of combined nitrogen in every form was ·231 lb. The above quantity of water supplied by the Chelsea Company had been, after its descent to the earth as rain, contaminated with sewage or manure matter equivalent to 1325 lbs. of average filtered London sewage. By gradual oxidation, partly in the pores of the soil, partly in the Thames or its tributaries, and partly in the reservoirs, filters, and conduits of the company, this sewage contamination had been entirely converted into comparatively innocuous inorganic compounds before its delivery to consumers. Finally, 100,000 lbs. of the Chelsea Company's water contained 22·0 lbs. of carbonate of lime, or an equivalent quantity of other soap-destroying ingredients

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited) . .	20 0 0	nil.	16 10 0
1000	20	Do., preference .	20 0 0	10 0 0	27 10 0
750	20	Do., do., redeem.	10 0 0	10 0 0	12 10 0
30000	5	Bombay (Limited).	5 0 0	£5 intr.	4⅜ to 5
10000	5	Do., third issue .	4 0 0	£5 intr.	3⅜ to 4
10000	20	British, Limited . (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton (Potteries), Trowbridge, & Holywell.)	20 0 0	10 0 0	28 to 29
12000	50	*Chartered*	50 0 0	8 10 0	53 to 54
6000	50	Do.	35 0 0	8 10 0	36 to 37
10000	20	*City of London*, A shares	20 0 0	8 0 0	24 to 25
10000	10	Do., B shares	10 0 0	4 0 0	6½ to 7
8000	10	Do., new shares.	10 0 0	8 0 0	11½ to 12¼
25000	25	City of Moscow (L)	25 0 0	£7 intr.	16 to 17
17490	25	*Commercial* . . .	25 0 0	10 0 0	31 to 32
2500	20	Continental Union.	20 0 0	8 0 0	14 to 15
17500	20	Do.	15 0 0	8 0 0	9 to 10
10000	20	Do., preference .	20 0 0	7 0 0	
5827	5	County & Gen. (L)	5 0 0	nil.	
2000	5	Do., preference . (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0	nil.	
5000	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 14
5000	10	Do., preference .	10 0 0	6 0 0	12½ to 13
10000	10	Do.	2 10 0	7 0 0	2½ to 3
4000	50	*Equitable*	50 0 0	10 0 0	66 to 67
4000	25	Do., new shares.	25 0 0	10 0 0	33 to 34
23406	10	European (Lim.) .	10 0 0	10 0 0	13 to 13¼
12000	10	Do., new shares. Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	6¼ to 6⅝
20000	10	*Gt. Cent. Gas Cons.*	10 0 0	10 0 0	12½ to 13
5000	10	Hong Kong (Lim.)	10 0 0		8 to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	66 to 67
1300	100	Do., bonds . . .	£100	10 0 0	173 to 174
2391	25	Imperial Austrian.	25 0 0		
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	93 to 95
400	100	Impl. Mexican (L.)	75 0 0		
3000	40	*Independent* . . .	40 0 0	10 0 0	53 to 56
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	62 to 63
5610	25	Do., 1st pref. .	25 0 0	6 0 0	25 to 27
503	50	Do., 2nd pref. .	50 0 0	6 0 0	
214	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sk		6 0 0	
11828		Do., 2nd pref. sk		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	4 0 0	3¼ to 4
6000	5	Do., preference .	4 0 0	7 0 0	4 0 0
30000	5	Oriental, Calcutta	5 0 0	8 10 0	5⅜ to 5⅝
30000	5	Do., new shares.	1 0 3	8 10 0	1 to 1¼
10000	5	Ottoman (Limited)	5 0 0		1¼ to 2⅛
10000	10	Parà (Limited) . .	10 0 0	6 0 0	9½ to 9⅝
27000	20	*Phœnix*	20 0 0	10 0 0	26 to 26¼
3600	100	Do., new	25 0 0	7 10 0	24 to 25
144000	Sk.	Do.	100 0 0	5 0 0	70 to 71
5000	20	*Ratcliff*	20 0 0	10 0 0	22 to 24
	20	Rio de Janeiro (L).	20 0 0	10 0 0	21¼ to 22⅛
6959	5	Singapore (Lim.) .	5 0 0	3 10 0	
2000	5	Do., preference . Shanghai	5 0 0	7 10 0	
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	68 to 70
15000	10	*Surrey Consumers*	10 0 0	9 0 0	12½ to 13
10000	10	Do., new	5 0 0	9 0 0	7 to 7½
9000	4	United General . . (Limerick)	4 0 0		
10000	10	*Victoria Docks* . .	5 0 0	6 0 0	
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13½ to 14
20000	10	Western (L.) A sh.	10 0 0	10 0 0	13½ to 14
10000	10	Do., B shares.	5 0 0	10 0 0	6⅞ to 7
10000	10	Do., C shares.	4 0 0	10 0 0	5½ to 6
20000	10	Do., D shares.	1 0 0	10 0 0	1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 18 0
551	10	West London Junction (Lim.). .	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

The waters of the Southwark and Grand Junction Companies were turbid when drawn from the mains. The water supplied by the East London Company from their reservoirs at Old Ford has been specially examined for present sewage contamination (*i.e.*, sewage existing as such at the time the analysis was made), but no such contamination was detected.—I have, &c., E. FRANKLAND.—The Registrar-General, &c."

THE ALLEGED NUISANCE AT THE CANTERBURY GAS-WORKS.

At the Usual Fortnightly Meeting of the General Purposes Committee of the Canterbury Town Council, on the 30th ult., the following correspondence was read with reference to an alleged nuisance at the Canterbury Gas-Works:—

Canterbury Gas and Water Company, Secretary's Office, May 18, 1867.

Dear Sir,—In consequence of the complaints which have been made of a nuisance stated to proceed from the premises of the gas company, the directors have desired the proprietor of a large chemical factory in London to inspect the works, with the view of ascertaining, if possible, the cause of such complaints.

A report has been received by the directors on the subject, and they instructed me to forward you a copy of it, and to state that they have also placed another copy in the hands of the contractors, Messrs. Anderson and Jones.—I am, &c.,

JAMES BURCH, Secretary.

R. W. Flint, Esq., Town-Clerk.

The report referred to was as follows:—

22, *Great St. Helen's, London, E.C., May* 17, 1867.

To the Directors of the Canterbury Gas Company.

Gentlemen,—On Wednesday last, at the request of Mr. Montague Kingsford, I inspected the sulphate ammonia plant at your works, and found no offensive smell during the hour and a half I was on the premises.

The plant, as explained to me, consists as follows:—

A covered tank, sunk in the ground, containing the ammonical liquor, which is pumped in two tanks. It would, I think, be an improvement to have these covered, as an offensive smell arises in hot weather. These tanks supply the boiler, which, when brought into ebullition, drives off the ammonia into an adjoining leaden steamer, containing diluted sulphuric acid. This plant is, I think, best adapted to the purpose; and in only one way can I account for any vapour arising, namely, in case the boiler be filled too full, and the ammoniacal liquor boil over into the steamer containing the sulphuric acid.

The steamer containing the diluted sulphuric acid would answer the purpose better if it were a close one, as then, in case of accident, any offensive vapour would be conducted through the pipe leading to the flue, and this, being red hot, the flames would consume the gas. It is my opinion that the business might be conducted without the least offensive smell.—I remain, &c.,

C. KINGSFORD.

Alderman BOORMAN asked if the nuisance was abated.

The INSPECTOR of NUISANCES answered that it had not been so offensive since proceedings had been taken against the contractors.

The TOWN-CLERK: The local board can apply to the Court of Chancery for an injunction against the contractors continuing the nuisance.

Alderman ARIS: At the time the matter was brought before the magistrates, Messrs. Anderson and Jones objected to the case being decided in other than a superior court. If the nuisance is repeated an indictment can be preferred against the parties at a court of quarter session.

The MAYOR suggested that no proceedings be taken until a fresh nuisance arose, and in the event of this occurring, the course referred to by Alderman Aris should be taken.

This was decided, and the discussion dropped.

A NEW MATERIAL FOR GAS MAKING.—According to a Swiss journal a means has been discovered of utilizing cockchafers. The *Estafette* of Lausanne states that between four and five millions of those insects were recently sent to Friburg for the manufacture of gas, and the residue forms an excellent carriage grease.

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.			Glasgow.			Newcastle			Wales.			Yorkshire, Derbyshire, and Staffordshire.		
	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
Pig Iron, No. 1 (g.m.b.)	3	15	0	2	14	6	2	12	6	3	10	0	3	10	0
1½ and 2-inch Socket-pipes	7	10	0	6	0	0	6	15	0	6	15	0	7	10	0
2½ and 3-inch ditto	7	0	0	6	0	0	6	5	0	6	10	0	7	0	0
4 and 5-inch ditto	6	10	0	5	10	0	5	15	0	6	0	0	6	10	0
6 inches and upwards ditto	6	5	0	5	0	0	5	10	0	5	15	0	6	5	0
Retorts, 1st fusion, hot blast	6	0	0		—		5	5	0	5	10	0	6	0	0
Ditto, 2nd ditto, cold ditto	7	0	0	5	15	0	5	15	0	6	0	0	7	0	0
Tank-plates, ¼ thick and above	6	10	0	5	10	0	5	10	0	5	15	0	6	5	0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.		1½ in.		1¼ in.		1 in.		¾ in.		½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Patent Welded Tubes, from 2 to 12 feet—per foot	1	8	1	0	0	10	0	7	0	5	0	4½
Ditto ditto, from 6 inches to 18 inches—each	3	0	2	0	1	9	1	3	1	0	0	9
Connecting-pieces, or Long Screws	3	6	2	3	2	0	1	6	1	2	0	11
Bends, Springs, and Elbows (wrought iron)	3	9	2	3	1	9	1	0	0	10	0	8
Tees, wrought or cast	4	0	2	6	2	0	1	6	1	1	0	10
Crosses, ditto	4	6	3	0	2	6	2	0	1	6	1	2
Iron Cocks	17	6	9	6	7	6	4	6	3	3	2	6
Ditto, with brass plug	28	0	16	0	13	0	7	0	5	6	4	6
Diminishing Sockets, Caps, Plugs, and Nipples	1	3	0	9	0	8	0	6	0	5	0	4
Plain Sockets	1	0	0	8	0	7	0	5	0	4	0	3
Syphons, 2-quart	15	0	14	0	13	6	13	0	12	0	—	

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Haswells, Nettlesworth Primrose, and South Pelaw	7s. 6d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	8 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead (at Leith)	55 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	32 6
Ditto (at Granton)	30 0
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	23 0
Pirnie, or Methill	15 0
Lothian's Cannel (at Leith)	28 0
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	5s. 6d
Cork	9s. to 9 6
Dover, Folkestne, & Ramsgate	6s. to 6 3
Dublin	9s. 6d. to 10 0
Exeter Quay	8 6
Ipswich	5 0
London (from Leith)	8 0
London (Pool)	6 0
Lowestoft and Yarmouth	4 6
Portsmouth & Southampton	7 0
Plymouth	7 6
Shoreham	6 9
Whitstable	5 9
Weymouth	7 6
Foreign.—Per Keel:—	
Barcelona	£19 10
Bordeaux	13 10
Boulogne and Calais	6 10
Cadiz	14 0
Cronstadt	9 0
Copenhagen	8 5
Genoa	£16 to 16 10
Hamburg	7 10
Havre de Grace	8 10
Leghorn	17 0
Lisbon	14 0
Rotterdam	7 0
Stettin	8 15
Trieste	17 10
Venice	19 0

SUNDRIES.

Best Natle. Fire-bks., p. 1000, £2 10s. to	£2 15 0
Cliff's Fire-bks. (at Wortley), p. 1000	2 15 0
Ingham's ditto (at Wortley), p. 1000	2 15 0
Fire-clay Retorts, p. ft. run, 5s. 6d. to	6 7 0
Tough Cake Copper, p. ton	81 0 0
English Pig Lead, p. ton	19 17 6
Welsh Bar Iron (in London), p. ton	6 10 0
Foreign Spelter, p. ton	21 0 0
English Block Tin, p. ton	89 0 0
Banca, p. ton	92 0 0
Tarred Rope Yarn, p. cwt.	1 0 0

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

TO GAS-FITTERS.

WANTED, several Good Hands, used to iron pipe and lead pipe fitting. State wages required, and send references to GEO. BOWER, Gas Engineer, St. Neots, HUNTS.

TENDER FOR GAS COALS.

THE Directors of the Slough Gas and Coke Company are prepared to receive TENDERS for the supply of 800 tons of NEW PELTON GAS COALS.

Forms of tender may be had on application, and the tenders to be delivered under seal, marked "Tender for Coals," at the Office of the Company, at Slough, by the 4th day of July next.

The Directors reserve the right to reject any or all the tenders.

By order of the Directors,
JOHN H. HETHERINGTON, Secretary.

Slough, June 6, 1867.

GAS APPARATUS.

FOR SALE, at the Works of the Crystal Palace District Gas Company, 4 PURIFIERS, 8 ft. square, in sets of two, with lifting apparatus, valves, &c., complete; 2 Beale's Exhausters, 1 Wright's Exhauster Governor, 1 Pooley's Weigh-bridge complete, 1 Annular Condenser, and other gas apparatus.

To be seen at the Works of the Company on application to the Engineer and Manager, Mr. E. S. Cathels.

By order of the Board,
MAGNUS OHREN, Secretary.

Offices at the Works, Lower Sydenham, S.E.

WREXHAM WATER-WORKS COMPANY.

SECRETARY & MANAGER WANTED.

THE Directors of the Wrexham Water-Works Company require the Services of a competent person to act as MANAGER and SECRETARY. He will be required to devote his whole time to the service of the Company; to keep the accounts and collect same. He must have a knowledge of Water-Works details, including the repair of works, mains, and service-pipes, and to have been employed previously on Water-Works. Salary £125 per annum. Security will be required.

Apply, by letter only (enclosing testimonials), not later than the 22nd day of June instant, addressed "To the CHAIRMAN of the Water-Works Company," Wrexham, NORTH WALES.

Wrexham, June 4, 1867.

TO BE SOLD, for £5 per ton, a Second-hand BOILER, 32 ft. long, 5½ ft. diameter; weight about 7 tons. Will contain about 4000 gallons.

Apply to JOSEPH JONES, Centre Vale, LLANDUDNO.

TOTTENHAM & EDMONTON GAS COMPANY, LIMITED.

MR. A. RICHARDS will SELL BY AUCTION, at the Lecture Hall, Tottenham, on TUESDAY, June 18, at Six o'clock in the evening, 190 SHARES in this well-established Company, the greater portion original £5 shares, and the remainder the third issue, with £2 paid.

Particulars of the AUCTIONEER, Tottenham.

TENDERS wanted for the following GASHOLDERS:—

40 ft. by 12 ft.,	delivered at	North London Railway.
35 ft. by 10 ft.	do.	Exeter.
30 ft. by 10 ft.	do.	Thorparch, N. E. R.
28 ft. by 8 ft.	do.	Poole, Dorset.
25 ft. by 8 ft.	do.	Exeter.
25 ft. by 8 ft.	do.	Axminster.
25 ft. by 8 ft.	do.	St. Margaret's.
20 ft. by 8 ft.	do.	Bottesford, nr. Grantham.

For specifications, apply to Messrs. STEARS BROS. and Co., Gas Engineers and Contractors, 3, George Street, HULL, and 73, COLEMAN STREET, E.C.

COAL TAR.

TO BE LET, for One, Two, or Three Years, the TAR produced at the Works of the Sunderland Gas Company, from the 1st day of July next. Quantity about 200,000 gallons per annum.

The principal manufacturing station of the Company has a siding on to the North-Eastern Railway, and is a short distance from the South Dock.

The Directors will receive tenders until Tuesday, June 18.

JOHN H. COX, Secretary.

Sunderland, May, 1867.

PIRNIE OR METHILL CANNEL.

ONE of the best Gas Producing Can-nels for bringing up the quality of ordinary coal gas. See Dr. Frankland's Lecture, reported in the JOURNAL OF GAS LIGHTING, 30th of April last.

For price apply to PIRNIE COAL COMPANY, Leven, FIFE.

GAS EXPLOSIONS PREVENTED

BY THE USE OF

JOHN RUSSELL & CO.'S TUBES & FITTINGS.

Gas Explosions are of frequent occurrence, but we do not hear of them unless death has resulted. As in the case at Clerkenwell lately, gas explosions may generally be traced to the use of Tubes of defective workmanship and inferior iron. Adopt the Tubes and Fittings of John Russell and Co., which are all of the best quality.

JOHN RUSSELL & CO.

ARE THE

INVENTORS OF THE LAP-WELDED TUBE FOR LOCOMOTIVE & MARINE BOILERS,

AND THE OLDEST MANUFACTURERS OF TUBES FOR GAS, STEAM, & WATER.

WAREHOUSES:

69, Upper Thames Street, E.C.; Commercial Street, N.E.; & Charles Street, Soho Square, London; Also at 35, 36, 37, and 39, Granby Row, Manchester.

MANUFACTORIES:

The Old Tube Works, Wednesbury, and the Alma Works, Walsall, Staffordshire.

Address to 69, UPPER THAMES STREET, LONDON, E.C.

WILLIAM & BENJAMIN COWAN,

(ESTABLISHED 1827,)

WET AND DRY

GAS-METER MANUFACTURERS,

BUCCLEUCH STREET WORKS, EDINBURGH.

N. DEFRIES,

INVENTOR OF THE FIRST SUCCESSFUL

DRY GAS-METER.

210,000 IN USE.

WORKS:

DIANA PLACE, EUSTON ROAD, LONDON.

WANTED, in Berlin, a Manager of the technical department in the Municipal Gas-Works, being the most extensive in Germany. He would be entrusted with the superintendence of three Gas-Works, which, being constructed according to the newest systems, supplied last year 900 millions of cubic feet of gas. The establishment of a fourth work is intended. He would also be obliged to project the plans of increasing both the works and the pipes, and to take care of their being completed in the best way.

Any professional gentleman, who has already been the manager of a large Gas-Work would find in this situation the best sphere for his activity combined with a liberal salary.

Candidates for this place must send in their testimonials of their capacity before the 1st of August, 1867, and also a certificate which proves their having been before entrusted with the management of extensive Gas-Works, and address them to "The Municipal Gas-Works of Berlin, Kœnig Strasse, No. 7." Salary and further particulars will be agreed upon with the qualified candidate.

THE MAGISTRATES OF BERLIN.

Berlin, May 4, 1867.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the London Tavern, Bishopsgate Street Within, on TUESDAY, the 28th of May, when the following resolutions were passed:—

Resolved—"That the Report upon the affairs of the Association now read be received and entered on the minutes."

Resolved unanimously—"That a Dividend of £3 10s. per share, and a Bonus of £1 per share, be declared upon the 28,000 shares of the Association, for the half year ending the 31st of December last, and that the said Dividend and Bonus be payable, free of income-tax, on and after the 15th of June inst."

Resolved unanimously—"That John Wilkin, Esq., be re-elected a Director of the Association;" "That Nathaniel Montefiore, Esq., be re-elected a Director of the Association;" "That Joseph Sebag, Esq., be re-elected an Auditor of the Association."

"That the cordial thanks of the Meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair."

By order of the Board of Direction,
ALBERT F. JACKSON, Secretary.

30, Clement's Lane, Lombard Street,
London, June 1, 1867.

PHŒNIX GASLIGHT and COKE COMPANY.

NOTICE is hereby given, that the HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to the present Midsummer £300 paid-up capital and upwards in the said Company, will be held on WEDNESDAY, the 3rd of July, at Two o'clock exact time at this Office, for the purpose of making a call of 10 per cent. on the New Stock, to be payable on the 1st of August next; and the said Meeting will be then adjourned to Wednesday, the 9th of October, at the Bridge House Hotel, for the purpose of declaring a Dividend, and on other business.

By order of the Court of Directors,
CHARLES PRIDDEN, Secretary.

70, Bankside, London, S.E., June 6, 1867.

The Transfer Books (preparatory to the above Meeting) will be closed on the 24th inst., and reopened on the 1st of July.

BALANCE-SHEETS AND REVENUE ACCOUNTS.

A FIRM of Accountants, much engaged in the preparation of Gas Companies Accounts, are open to contract for the keeping, balancing, or auditing the books of other Companies, which, from their experience, they are enabled to do on moderate terms.

Address, SANDELL & MADDERS, Accountants, 4, Skinner's Place, Size Lane, LONDON, E.C.

GAS OF HIGH ILLUMINATING POWER.

THE Trinidad Petroleum Company, Limited, will supply samples of their Trinidad PITCH for gas purposes of 1 lb. each free of charge, or samples of 1 ton or upwards at 45s. per ton, delivered on to the railway at Silvertown, on application being made to their SECRETARY, at the Offices of the Company, 110, CANNON STREET, E.C.

EDMUND SMITH,

GRASBROOK, HAMBURG,

would respectfully call the attention of engineers and managers of gas-works to his Newly Improved GAS-METER, patented 1862 in England, and the principal parts of the Continent.

Price-lists and tenders for gas-meters, experimental station-meters, experimental holders, governors, purifiers, gasholders, pressure-gauges, gas and water fittings, &c., are forwarded on application.

AUCHINHEATH, Lesmahago, Gas COAL, known in the market for the last fifty years as a first-class gas coal.

JAMES FERGUSON and CO.,

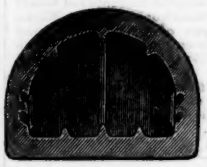
Sole Lessees of the Auchinheath Coal-Field, are prepared to ship the above at Glasgow, Greenock, and Ardrossan, on the west coast of Scotland; and at Granton or Leith, in the Firth of Forth, on the east coast. Also to forward them to any railway-station in Scotland or England.

Price and other particulars may be learned by addressing

JAMES FERGUSON and CO.,
GAS COAL WORKS,
LESMAHAGO.

FRASER'S PATENT RETORTS.

THE RIBBED IRON RETORTS



Have now been in use about three years, and continue to give satisfaction. The

PATENT CLAY RETORTS

Will work off the Gas from the Coal in less time, and Carbon does not form in them so freely, nor adhere so firmly, as to Plain Retorts.

Further particulars and prices on application to Mr. A. C. FRASER, Engineer to the Gas Company, COLCHESTER.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gasfittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gasfittings and Gas Apparatus.

MARTIN'S

LEE MOOR PORCELAIN FIRE-BRICKS,

Containing no Lime, and only ·45 of Oxides, resist the strongest heats, and will last for Gas-Works longer than any others.

Samples and prices sent, and the highest references given, on application to

MARTIN BROTHERS,
ST. AUSTELL, CORNWALL.

SAMUEL CUTLER & SON,

CONTRACTING GAS ENGINEERS, &c.

MANUFACTURERS OF GASHOLDERS, TANKS, PURIFIERS,

AND ALL DESCRIPTIONS OF GAS-MAKING APPARATUS.

Iron Roofs, and General Iron Work. Mains Supplied and Laid.

S. C. & SON supply every requirement for a Gas-Work, and keep in stock Retort Lids, Costers, Barrows, Scoops, Bolts and Nuts, &c. &c.

PROVIDENCE IRON-WORKS, MILLWALL, LONDON, E.

WOLVERHAMPTON RETORT WORKS.
ESTABLISHED 1840.

JOHN EUNSON AND SON,

GAS ENGINEERS, AND MANUFACTURERS OF CLAY RETORTS,

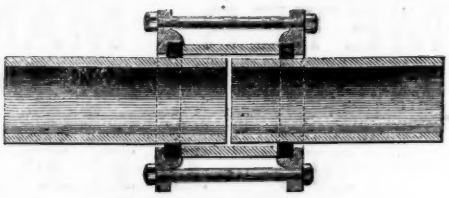
AND FIRE GOODS IN GENERAL,

WOLVERHAMPTON.

Retort Mouthpieces, Bolts, Nuts, and every description of Wrought-Iron Work.

DR. NORMANDY'S

PATENT PIPE-JOINTS.



SOLE MANUFACTURERS—

A. NORMANDY and CO., Engineers and Ironfounders,

HOLLY BUSH PLACE, BETHNAL GREEN ROAD, LONDON, N.E.

Also Sole Manufacturers of the Patent Marine Aërated Fresh-Water Apparatus, Steam Pumps Steam Winches, &c.

These Joints have been in use nearly three years on gas-mains, and are still perfectly sound. They have also been proved quite sound under a pressure of 680 feet head of water.

The advantages which these Joints offer are economy, perfect soundness and durability, ease and rapidity of application, use of perfectly plain pipes, so that a tight Joint may be made with cut pipes, even though the ends do not come close together. Any ordinary labourer is capable of securely fixing them.

These Joints are particularly applicable to gas, water, and suction pipes, and remain permanently sound; they are cheaper than the socket-joint, as they save the lead, the gasket, the iron forming the socket (which in a 3-inch main amounts to 10 lbs.), and the fire for melting the lead. There is also considerable saving of time, more than four Joints being made in the time required for making only one of the others, and by unscrewing the bolts, a pipe can be removed and replaced with the greatest facility.

By means of these Joints, which are made of all sizes, pipes made of either wrought or cast iron, copper, lead, tin, earthenware, glass, bitumen, gutta-percha, suction-hose, &c., may be rapidly and soundly united, and taken apart with facility.

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The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 25, 1867.

Notes upon Passing Events.

The report on railways, which we analyzed in our last "Notes," was signed by the Duke of Devonshire, Lord Belmore, Messrs. Leveson Gower, Robert Lowe, Thomas B. Horsfall, Robert Dalglish, George Carr Glyn, Acton Ayrton, Douglas Galton, Edward Hamilton, and J. R. M'Clean—weighty names, representing every kind of knowledge connected with the subject, practical, scientific, and politico-economical. Two commissioners dissent—Mr. Monsell, on the treatment of Irish railways only, and Sir Rowland Hill. On Irish railways we will not venture to offer an opinion. If we are to believe Irishmen, it is impossible to get honest directors in Ireland; we know that it is difficult to get them both honest and efficient in England. Sir Rowland Hill, K.C.B., as we before remarked, having conquered the old Post-Office authorities, longs, like an official Alexander, for new realms to subdue. Having established what can scarcely be denied, that railways are monopolies, he jumps at once to the conclusion that they should, therefore, be in the hands of the Government; that either a department of Government should be created for the purpose, or the superintendence of railways should be committed to one of the existing departments, and this department should lease the lines purchased from the present shareholders to individuals or companies to work, fixing suitable terms, and enforcing due observance of the contracts. The rent to be paid, if not in advance, weekly or monthly. The lessees to be selected who will adopt the lowest tariff of charges for passengers and goods. At the termination of a lease any falling off is to be made good by a money payment by the lessees, and any increase in value paid for by Government, Government to give consent to additions and extensions. "As respects the construction of new lines, the Government "might either agree beforehand on what terms they will buy "the line, or allow the business to proceed as at present, the "owners being at liberty either to work the line or sell it to the "Government." The advantages of this scheme are supposed to be that the Government would buy good bargains, and realize a profit on each transaction; that the shareholders would get a safe dividend, higher than if they worked a line themselves; that the cost of parliamentary contests would be saved, as a Government would order if not execute; that railways not needed would not be made; that a large reduction in the fares of passengers and in the freight of goods would be effected; and that greater security against accidents would be obtained. The purchase and leasing of existing lines by Government necessarily implies a board or staff of officials competent to supervise every kind of railway work. Sir Rowland Hill is particular in "urgently advising that the selection of the head of the department "should be made in exclusive reference to fitness for "the post." But what reason have we to rely on such appointments being made more carefully and appropriately than in any other department of Government—the dockyards for instance? Where is the model engineer or traffic manager official to be found fit to have "the uncontrolled appointment "and dismissal of all his subordinates"? The question of dilapidations, as applied to houses, is one of the most fruitful causes of litigation; but who can picture the daily duties of the inspector who had to report on the condition of the permanent way, the rails, the bridges, the viaducts, the rolling-stock of a railway, and, perhaps, call upon the lessees to sink all their profits on what their own engineer considered unnecessary repairs? The majority of the commissioners investigated the question of this new railway department, and came to the conclusion that it would be enormously costly and most probably inefficient. Bad men would be dear at any price, and either good or bad men would require pay and pensions that would soon amount to a formidable dead weight on the department. The advantages that the Government would have in dispensing with parliamentary contests can scarcely be appreciated at the present day, when there is so little territory not supplied with railways, and the same point will apply to the purchase of land. Of course, in both cases the decision of a despotic would be much cheaper than a parliamentary government. The cheaper rates, the enormous reduction on fares, are assumptions for which the majority of the commissioners can find no ground. The straits to which the Brothers Hill are reduced for arguments may be judged from their dwelling on such clap-trap as the advantage of carrying town sewage and mixing soils, and on the probable diminution of accidents in consequence of an improved signal system and the establishment of communication between driver and guard. Sir Rowland Hill's only positive scheme for economy in working is to be obtained by increasing the number of points at which passengers must change carriages. That is to say, the convenience of passengers is to be reduced to the minimum in order that the profits of the railway may be raised to a maximum. Sir Rowland asks for more facilities for the Post-Office traffic. On this the other commissioners truly remark that the Post-Office may easily obtain all it can justly require by embodying its wants in one general Act of Parliament, with an arbitration clause. Sir Rowland devotes some paragraphs to considering the very useless question of the benefits the country would have derived if our present network of railways had been completed without parliamentary contest, without competing

lines, and without excessive compensation to landholders. To take all the good of one system, without any of the bad, would be very satisfactory, but as it is impossible, it is childish to discuss it. With railways planned and executed under the sole control of a Government Board, we might have had three or four trunk lines paying enormous dividends, or supporting an enormous staff of Government officials, but we should not have had the complete network which now unites every centre of the least importance, and has had no small share in creating the prosperity which has repealed so many taxes, and lightened the burden of those we still pay. The majority of the commissioners came to the conclusion that the purchase of the railways by the State was not likely "to produce a "pecuniary gain," or to bring about "a large reduction in "fares and freights," or to produce "great efficiency of "management," and that increased postal facilities could be obtained by simpler means. These views are supported by British evidence and all continental experience.

To keep the streets of a great city clean is a problem which those who have thought the least about it are the most ready to solve. Those who understand it find their greatest difficulty in the cost. In the City of London, where every feasible scheme of street improvement may be tried, Mr. William Haywood, the engineer to the commissioners, has been trying a series of experiments in "cleansing streets by washing"—a plan that seems very easy but is not very cheap—and he has made a report, from which we extract the following reliable information. The district selected was the line of thoroughfare which began at the western end of Cheapside and terminated at the junction of King William Street, Lombard Street, and Cornhill with Mansion House Street, and included the large open space in front of the Mansion House. This line of street is 2000 feet long; the superficial area of the carriage-way is a little under 10,000 yards. Sixteen hydrants were fixed at an average distance of 16 feet from each other. The first experiments were made in September last, and they were continued for a week at a time at different periods of the year; the weather, however, happened on each occasion to be tolerably fine. Ten men were employed with two jets each morning for two hours and three-quarters. Two men who assisted in moving the hose also swept the surface near the kerbs while the water was playing, so as to save passengers from the annoyance of the jet being directed close to the footways. The straw and refuse which would not go down the gullies was washed into the channels by the action of the water, and was then swept up and removed by scavengers. The quantity was scarcely a quarter of a load daily. The work was generally done between half-past two and six o'clock in the morning. The quantity of water consumed was about two gallons to each square yard. The streets were much cleaner than after ordinary scavengering, and this was most marked when rain came on after washing, for the surface did not become muddy until toward the end of the day, whilst the other streets of the City became muddy rapidly. On the whole, the comparison was greatly in favour of the surface cleansed by water. The cost of the machinery was £1175 per mile lineal; the cost of washing nearly 20s. for each washing, labour forming about half of that sum. There are about seven miles of thoroughfare in the City similar to those washed, and the annual cost of cleaning them by water would amount to £7932. These seven miles are leading thoroughfares. The cost of water at its present price would amount to £3282 per annum, and for the whole City to £6000 per annum. But this is filtered water, of the same quality and price as that supplied to the breweries. Mr. Haywood suggests that the water should be obtained direct from the Thames, and if the washing system be adopted the magnitude of the demand would justify some expense in pumping machinery for obtaining a cheaper supply. It would be objectionable to wash the streets in frosty weather, and in severe weather it would be impossible to use it; therefore the services of a staff of men, carts, and horses must be retained for emergencies. Pavement kept so clean will be more slippery during dry weather, and less slippery in damp greasy weather. The superior cleanliness will make the streets more noisy. Mr. Haywood thinks that the sewers would not be injured, and that the sewage about to be used for the reclamation of waste land would be improved by the admixture of street sweepings.

The dearth of oysters has been one of the latest, and not one of the least severe taxes which London and Paris have had to endure. Mr. Frank Buckland, from time to time, gives us some glowing pictures of a good time coming, when oysters at 6d. a dozen shall be served up with kangaroo soup and other delicacies made common by the Acclimatization Society; but Mr. Buckland, a most amusing lecturer and indefatigable naturalist, has too much poetry in his composition to inspire unbounded confidence in his dreams of oyster culture, although we know that all that scientific energy can do will be done by him. At a recent meeting of the very useful Food Committee of the Society of Arts, Mr. George Hart, the superintendent of the Hayling Oyster Fishery Company, gave evidence, from which we condense the following points:—It seems that the grounds from which the Whitstable and Colchester fishermen formerly dredged the young fry, which they afterwards fattened at home, have been so over-dredged that the supply required is not to be had, hence 1s. 8d. a dozen for native oysters. M. Coste is the great authority of France on oyster culture, his efforts having been very, although not always, successful. At St. Brieux and Caucole, the fascines he had sunk over the beds averaged some 20,000 oysters each, being in deep water exposed to north-west winds. The returning winter gales drove them from their moorings, and destroyed both the brood and the parent oysters. At the Isle de Rhé, where the shores are also exposed to severe gales and heavy seas from the Bay of Biscay, a better arrangement was adopted. A series of half-tide ponds were formed with the rocks that there strew the coast, and the breeding oysters were placed under rows of stones in their ponds; in some instances tiles are used instead of stones. At Arachen, tiles yield good results, but they have not answered at Poole, Southend, or Herne Bay. At Hayling, 900 acres of suitable mud-banks, a portion of which was bounded by a railway bank, have been leased for oyster culture by Mr. Hart's company. Thirty acres are now under cultivation; twenty thousand hurdles and a million of breeding oysters have been laid down, with a collecting service of nearly ten acres. In the course of the operations a pond of four acres, on the east side of Hayling Island, was laid dry, the weeds cleared to the extent of an acre, and covered with sand and shingle. On this hard bottom, in April, 1866, 50,000 oysters were deposited, together with about 80 hurdles of 15 square feet each placed over them horizontally and secured by stakes. On the 15th of June a considerable fall of spat took place; but it was not until July that any were found attached to the hurdles; but on the 13th of that month the hurdles were found literally covered on the under side with oysterlings of about 1-10th of an inch in diameter, deposited at the rate of 600 per square foot of surface. The shingle was everywhere covered with spat, as also the rushes and banks of the pool. This crop, when grown to a marketable size, was valued by an oyster merchant at £2000. These oysters have not suffered from the winter, and are now growing rapidly. The same company have not yet succeeded in hatching salt-water fish, but have bred several thousand lobsters. Mr. Hart stated it was found necessary to enclose the whole of the breeding-ponds. A bank was carried along about 4 feet above the water-line, which was obliged to be made strong to withstand the heavy seas. There was a great difference between the temperature of the water inside and outside the ponds—as much as from 4° to 6° every day. The average temperature at that time was about 72°. Temperature had an essential effect upon the oysters, both in breeding and growing. The late very severe weather did not affect the oysters so as to kill them; but the old oysters were more delicate than the young ones in this respect. He called oysters of 10 or 12 years of age old oysters, and he had them about that size for breeding. He had a Colchester native which he should say was 30 years old. The great thickness of the shell was a test of the age; but beyond a certain period there were no certain rules to go by. To a certain extent the age could be known by counting the number of rings on the upper shell. Equability of temperature was most desirable, and to obtain that there must be a body of water not less than 2 to 3 feet deep. He liked the rays of the sun to penetrate to the bottom of the ground. The bottom of the water was much warmer than the top, as he had frequently tested in going over the grounds in a boat, the difference of temperature being quite perceptible to the hand; and in a distance of a few yards there might be a difference of temperature, according to the nature of the bottom, or according as it is more or less sheltered from the wind. There was

no spat in Chichester Harbour last year, except in their beds. By regulating the temperature they insured spat, while there was no natural spat outside. In a good season the spat was produced in such enormous quantity that, if preserved, it would be sufficient to stock the feeding-beds of the country for six or seven years in succession; but after many years, when there had been a want of spat, the beds became dirty, because it did not pay to dredge, and when the spat came the ground was in a bad state for it, and the spat was sacrificed. Last year the first experiment was tried in about four acres of ponds, and about one acre of shore for laying oyster ova. Eighty hurdles and 50,000 breeding oysters were employed. The success of last year was so decided that the operations this year were greatly extended—10 acres of collectors instead of 1200 feet; 20 acres of shingle instead of one; and a million of oysters instead of 50,000. The supply is dredged off the French coast, from ground which it was open for any nation to fish upon. Mr. Hart was asked—"After you have completely established, should you be so "fortunate as to do so, breeding-beds of this kind, it is not "necessary to recruit the ground at the same rate that you "have been doing; the mother oysters will continue to "breed?" He replied—"I should myself prefer to change "the breeding stock every year." This really sounds, to use a vulgar phrase, "like business." It sounds as if oyster culture could be made to pay, and that point once established, there will be no difficulty in finding both the sites and the capital on both sides of the Channel. Although it is impossible to help laughing, like Mr. Bernal Osborne, at the British schemes of the Acclimatization Society, the idea is being practically and usefully worked out in the Australian colonies, where there are no native quadrupeds of any value for food, for kangaroos and ground bears cannot be counted against deer and rabbits, or hares; and were even the wild birds fit for food, they are not numerous. It will be a great step if the wild woods and mountains can be peopled with eatable game, and the rivers stocked with trout and salmon. From Tasmania we have some very encouraging accounts of the culture of both trout and salmon, but without further evidence we must hesitate to believe that salmon will flourish in the semi-tropical climate of Australia. In the pisciculture of Australia the London Acclimatization Society has had a large share. It may not be generally known that there is a range of mountains in Australia so lofty and cool that children there have rosy cheeks, although the vegetation is semi-tropical.

Circular to Gas Companies.

The metropolis gas inquiry of 1867 has taken a most unexpected and somewhat embarrassing turn. When the committee reassembled, after the Whitsuntide holidays, on the 17th inst., they proceeded, as previously arranged, to take into consideration the Bills of the Chartered and of the Imperial Gas Companies, thereby interrupting the general inquiry in order that those Bills might be disposed of, that they might be presented to the House of Lords within the time required by the resolutions of that House. The case of the Chartered Company was accordingly opened by Mr. Hope Scott, who stated the objects of the Bill, omitting those portions of it relating to the illuminating power and the price, which were to be governed by the general measure for regulating the gas supply of the metropolis. As thus presented to the committee, it was a Bill for granting powers to the company to increase their capital by the issue of new shares to the amount of £650,000, to capitalize the sum of £360,000 expended on the works out of profits, with dividends limited to 5 per cent., and to borrow £477,500. It is also proposed to authorize the company to construct gas-works near Barking Creek, and to supply gas in bulk to the City of London Gas Company, who may become subscribers, and take shares in the Chartered Company to the amount of £150,000. After hearing the statement of the case, the chairman of the committee said they were of opinion they should best discharge their duty by continuing the general inquiry before dealing with the private Bills; nevertheless they wished the case for the Imperial Bill to be stated. On the following day accordingly Mr. Denison opened the case for the Imperial Company, omitting, as had been done by Mr. Hope Scott, all reference to price and illuminating power. By the Bill the company seek to be authorized to construct works at West Ham Abbey marshes, and to nearly double the present capital, which, with borrowing powers, amounts to £1,814,000. It was stated that since 1860 the company have been expending at least £100,000 a year in increasing their works, and it is estimated that for some years to come they will have to expend annually £160,000 for that purpose. Having heard the statement of the case, the further consideration of both Bills was postponed, the chairman promising, in the event of the two Bills passing the committee, to help the promoters in overcoming the difficulty of the resolutions in the House of Lords. The remainder of the day was occupied by resuming the general inquiry. Mr. C. E. Cawley, the chairman of the Gas Committee of the Salford Corporation, was examined to contradict some of the statements of Mr. Cleminshaw, the former manager of the Manchester Gas-Works. He stated that 5 per cent. of coal mixed with cannel was the largest proportion with which 21-candle gas could be produced at the Salford works, that the Manchester gas is of inferior quality to that of Salford, and that there were numerous complaints of the gas supplied in Manchester. He stated that the difference between the general charges of manufacture in Manchester and London is 3·1d. per 1000 feet, which was fully accounted for by the different circumstances of the two places; and that the actual cost last year per 1000 feet of gas for coal, material, and labour, was 31·41d. in London, as against 26·58d. in Manchester. The witness accounted for the difference between his statements and those of Mr. Cleminshaw by the want of practical experience on the part of the latter of what Manchester gas is at present. Mr. Baxter and Mr Hawksley were called on behalf of the gas companies on Wednesday, and their examination occupied the whole of the sitting. With reference to the working of the Metropolis Gas Act of 1860, Mr. Baxter observed that nothing could give more satisfaction than that Act, judging from the few complaints that have been made under it, and he pointed out that the legal remedies provided against the gas companies for non-compliance with its provisions had never been properly tested. He was examined at some length respecting the proceedings before the committee of inquiry last year, to show that the gas companies had been misled, by the observations of the chairman, to understand that no further evidence was required from them, and that the witnesses whom they had ready to be examined were therefore not called, and their case was consequently only imperfectly heard. An important paper was handed to the committee by Mr. Baxter, which we reprint on the adjoining page, and from which it appeared that the aggregate of the gas sold by the thirteen metropolitan companies in 1866 amounted to 8,653,517,551 cubic feet, of which 5,475,280,800 feet were common gas only, 2,839,948,751 feet common and cannel gas, and 333,288,000 cannel gas only. The cost of each kind of gas per 1000 feet was worked out under three heads, viz., coals, working expenses, and dividends, and the capital employed was shown to average £6 7s. 5d. per ton of coal carbonized. Mr. Hawksley contradicted the evidence of Mr. Hughes, Mr. Cleminshaw, and Dr. Frankland, as to the proportion of cannel coal required to produce 18-candle gas, and correcting their memoranda and data, he showed that the cost per candle above 12 candles amounted to 3½d. per 1000 feet. He expressed the opinion that the difference of one-sixth between the quantity of gas made and the quantity sold could not be materially reduced by any contrivance that the companies could adopt. Mr. Hawksley estimated that if the illuminating power were raised to 18 candles, the consumption would be reduced from 8600 millions of cubic feet per annum to 6450 millions, and that if the price were not raised the dividends would be reduced two-thirds, owing to the diminished consumption alone, and that if the companies were forced to supply 18-candle gas, they could not at present do so at a less charge than 5s. 8d. per 1000 feet and maintain the existing dividends. Speaking from his experience of the cost of manufacturing gas at Nottingham, he said the cost of construction and the cost of labour there are one-third less than in London; that the gas at the Nottingham works is equal to 18 candles, but that it loses 2 candles of illuminating power in passing through the mains into the town; that the maximum price charged in the town is 3s. per 1000 feet, and that the dividend of the company is only 5½ per cent. Mr. Hawksley also spoke to the increase of the cost of manufacture, which he estimated was doubled in about 46 years. When examined with respect to the best mode of purifying gas from sulphur, he said that he considered purification by lime the most effectual means, but that

TABLE *showing the Results of each Company's Operations in the Year* 1866, *and the Average of those making Coal Gas only, and those making both kinds; the Amounts being taken, so far as they therein appear, from the Parliamentary Returns.*

	Name of Company.	Gas Sold. Cub. Ft.	Coals. Tons.	Coals. Cost.	Residuals.	General Charges.	Amount required to Pay Interest and Statutory Divdd.	Total Capital.
Make common gas only.	Commercial	628,364,000	71,608	£62,303 9 5	£24,791 10 11	£39,778 6 3	£43,738 10 5	£437,720 0 0
	Great Central	389,443,800	51,393	39,802 11 11	22,623 12 10	34,076 10 1	23,300 0 0	266,000 0 0
	Imperial	2,380,521,000	299,009	246,560 6 4	99,884 8 7	182,941 1 6	160,995 16 8	1,814,755 15 0
	Independent	380,496,000	50,958	43,849 13 9	19,297 2 2	28,364 16 4	16,726 10 8	205,500 0 0
	Phœnix	839,088,000	103,471	81,793 14 1	46,654 2 8	67,442 9 2	71,661 8 0	888,620 0 0
	Ratcliff	145,128,000	21,087	17,242 12 6	7,390 4 11	13,025 2 2	10,458 1 4	114,000 0 0
	South Metropolitan	417,908,000	48,484	36,968 19 5	21,194 3 4	33,381 7 7	20,701 13 4	228,821 10 0
	Surrey	294,332,000	37,207	28,090 1 7	14,251 10 5	22,207 0 6	22,120 7 8	245,643 0 0
	Totals	5,475,280,800	683,217	556,611 9 0	256,086 15 10	421,216 13 7	369,702 8 1	4,201,060 5 0
	Averages (Per ton)	8,013	..	0 16 3·41	0 7 5·95	0 12 4·00	0 10 9·84	6 3 0
	Averages (Per 1000 cubic feet)	..	..	0 0 24·57	0 0 11·22	0 0 18·46	0 0 16·20	—
Make both common and cannel gas.	Chartered	1,204,228,000	153,634	140,358 17 9	49,344 10 0	99,940 10 4	81,000 0 0	810,000 0 0
	City	527,404,751	64,156	54,822 7 4	27,843 12 7	48,089 11 10	36,069 8 0	453,388 0 0
	Equitable	365,653,000	42,298	36,931 14 7	17,553 15 3	25,543 16 7	30,000 0 0	300,000 0 0
	London	742,663,000	89,946	80,018 18 5	40,633 0 3	64,256 10 4	57,013 9 4	725,631 0 0
	Totals	2,839,948,751	350,034	312,131 18 1	135,374 18 1	237,830 9 1	204,082 17 4	2,289,019 0 0
	Averages (Per ton)	8,113	..	0 17 10·08	0 7 8·84	0 13 7·06	0 11 7·92	6 10 1
	Averages (Per 1000 cubic feet)	..	..	0 0 26·20	0 0 11·44	0 0 20·10	0 0 17·24	—
Cannel only.	Western	338,288,000	39,657	46,162 8 6	11,321 3 3	26,685 4 11	31,371 18 8	345,460 0 0
	Averages (Per ton)	8,530	..	1 3 3·37	0 5 8·52	0 13 5·49	0 15 9·84	8 14 2
	Averages (Per 1000 cubic feet)	..	..	0 0 32·75	0 0 8·03	0 0 18·92	0 0 22·25	—

COMMON GAS. *Totals per* 1000 *Cubic Feet Sold.*	
Coals	24·57d.
Residuals	11·22
	13·35
General charges	18·46
	31·81
Statutory dividend and interest	16·20
	48·01d.

COMMON AND CANNEL GAS. *Totals per* 1000 *Cubic Feet Sold.*	
Coal and cannel	26·10d.
Residuals	11·44
	14·76
General charges	20·10
	34·86
Statutory dividend and interest	17·24
	52·10d.

CANNEL GAS. *Totals per* 1000 *Cubic Feet Sold.*	
Cannel	32·75d.
Residuals	8·03
	24·72
General charges	18·92
	43·64
Statutory dividend and interest	22·25
	65·89d.

TOTAL—GENERAL CHARGES . . . . . £685,732 7s. 7d. } = 19d. per 1000 cubic feet.
" GAS SOLD . . . . . 8,653,517,551 cub. ft. }
AVERAGE CAPITAL OF ALL THE COMPANIES . . = £6 7s. 5d. per ton carbonized.

the "sanitary philosophers" interfered to prevent the use of that material in towns; whereupon the chairman took up the examination for the purpose of ascertaining whether the objection to the use of lime would exist if the manufacture of gas were carried on at a distance from London down the Thames, and whether there would be much increase in the leakage from the mains at such a distance. Mr. Hawksley stated in reply that the principal difficulty in that case would be the disposal of the refuse lime, and that the leakage from the mains alone would be very trifling. He calculated that it would require 20 mains, each 3 feet in diameter, to conduct the whole quantity of gas supplied to the metropolis from works concentrated at such a distance. Mr. Hawksley said, in reference to burners, that it was not true that the burners now used in testing gas made it appear of greater illuminating power than those used in 1860, and that he used as good a burner in 1860 as any that has been contrived since. In his cross-examination Mr. Hawksley was questioned respecting the evidence he gave in the arbitration case between Mr. Croll and the Great Central Gas Company, when he represented that the cost of increasing the illuminating power from 10 to 12 candles was only 1d. per candle per 1000 feet; and he was pressed to reconcile the difference between his evidence on that occasion and his present statement, that the cost would amount to 3½d. per candle. The chairman took up the question with an unwonted degree of harshness, and Mr. Hawksley was urged to make calculations on the instant to explain the apparent inconsistency. He referred to the calculations he had already made to show that the cost of raising the price of gas from 12 to 18 candles would be 3½d. per candle, in consequence of the necessity, in the latter case, of using a large proportion of cannel; but the chairman insisted on his reconciling that statement with his former evidence, that 1d. per candle would be sufficient to raise the illuminating power from 10 to 12 candles by the use of Newcastle coal alone. Mr. Hawksley promised to make the requisite explanation if he were allowed time to calculate exactly the difference of the two conditions, and it was arranged that he should be further examined on that point at the next sitting of the committee, which was adjourned to the 25th inst. (this day). After Mr. Hawksley's re-examination, Mr. Hope Scott will sum up the case on the part of the gas companies, and he was requested by the chairman to state distinctly in his address what the companies consider to be the effect of the Act of 1860, in regard to their legal and equitable rights. The other counsel will then be heard in reply, and it is expected that the committee will afterwards announce their views on the whole question.

So far as can be gathered from the nature of the cross-examination of the witnesses adopted by the chairman, he and the committee are in favour of a considerable rise of the standard of illuminating power, with a corresponding advance in price, combined with some scheme for the removal of the present gas-works of all the metropolitan companies on the north side of the Thames to a monster gas Gomorrah to be created on land adjoining the outfall of the northern sewers at the mouth of Barking Creek, where the Chartered Company are seeking for power to erect their proposed new works. Where, in such a case, the 20 mains, each 3 feet in diameter, are to be laid—which, according to Mr. Hawksley's calculation, will be required to convey the gas at present consumed in the metropolis—has scarcely been thought of, nor the cost of compensating for loss of illuminating power in gas by travelling through 15 miles of mains. Even in new works the adoption of such a scheme would add 6d. per 1000 feet to the cost of gas for interest on capital alone, and any saving effected by the delivery of coals to water-side premises would be more than swallowed up by the decrease in the value of the residual products which such a remote situation would occasion. The chairman of the committee is unquestionably a man of large mind and progressive ideas, but his opinions appear to be influenced by the water inquiry of 1851, which resulted in compelling five of the water companies to take their supply from the Thames above Kingston and Hampton Court, from which source they are now threatened to be dislodged by rival schemes. The conditions of the supply of gas are, however, different from those of the supply of water. The illuminating power of gas becomes impoverished by travelling long distances, therefore it should be manufactured as near as possible to the point of consumption; and for this and other reasons a series of detached gas-works is to be preferred to a single monster work situated at some distance from the place of supply. Whether the existing arrangements of the districts of the metropolitan gas companies are best adapted to economize the distribution of gas may be questioned, and it is a point that has been only incidentally alluded to in the course of the inquiry; but we have no hesitation in asserting that the concentration of the whole manufacture on one spot would be a visionary and impracticable scheme.

Should the committee raise the standard of illuminating power above 14 candles, it will be incumbent upon them to

indicate some hitherto unknown sources from which the requisite supply of cannel may be obtained at reasonable prices. It has transpired, in the course of the evidence adduced, that 1,072,908 tons of coal were consumed by the metropolitan companies in 1866; and to raise the standard of illuminating power to 18 candles would require the use of at least 500,000 tons of Wigan cannel (or the equivalent of that quantity in Scotch cannel), which is the total present yield of the Wigan collieries. More than half of it is now consumed in Liverpool, Manchester, and Salford; a considerable portion is consumed in the gas-works of the neighbouring towns; and the remainder is sent out of the district to raise the quality of gas in more distant towns to the standard of 14 candles, as prescribed in most of the gas Acts recently passed. It is the increased demand for cannel produced by thus raising the standard of illuminating power which has been the chief cause of the advance in price that has taken price in Wigan cannel, amounting to 40 per cent. during the last few years; contracts having been renewed at 18s. per ton that were originally made at 12s. 6d. As the whole of the cannel collieries in that district have fallen into the hands of four or five bodies, there is at present no competition among them, and the prices must rise further with increased demand. In Scotland the same cause is operating to raise the price of cannel there. There are only four or five cannels out of upwards of twenty that are sufficiently rich in the yield of gas and products to compete in the London market with Wigan cannel; the products of the others being worthless, or the gas from them being little better than that from Newcastle coal. The owners of the richer descriptions are anxiously watching the proceedings of the committee on the Metropolis Gas Bill, knowing that if the quality of the gas is to be improved an immense rise must take place in the price of cannel, as the sources of supply are extremely limited. In Glasgow the cannel used by the old company has been raised 41 per cent. within two years—viz., from 14s. 11½d. per ton to 19s. 6d.—and we understand that this year the entire profits have been absorbed by the rise in cannel! The price at present charged for gas is 4s. 2d. per 1000 feet, with discounts to large consumers; but an advance on that price must be made to compensate for the increased cost of the materials of manufacture. Such must necessarily be the result of raising the standard of illuminating power in London to 18 candles; and the agitators for cheap gas may regret that they did not accept the offer of the companies to supply 14-candle gas for 4s. per 1000 feet, should they have to pay a higher price for gas of a superior quality. So far, however, as can be judged from the present state of the inquiry, it is probable there will be no legislation on the general question of the gas supply of the metropolis this year, but that a special report will be made by the committee to the House of Commons, to form the basis of future legislation.

On the second day of the inquiry Mr. Hughes made some statements relative to the prices charged, and the quality of the gas supplied, in some of the large towns, which we have ascertained to be in several respects erroneous, and with the view of correcting the repetition of the errors we append a correct statement, with the average prices paid for coal and cannel in the year 1866:—

Corrected List of the Prices and Quality of Gas in the Towns quoted by Mr. Hughes in his Evidence.

Name of Town.	Maximum Price per 1000 Feet.	Minimum Price per 1000 Feet.	Minimum Illuminating Power of a Burner consuming 5 Ft. per Hour.	Average Price of Coals and Cannel per Ton.
Birmingham	2s. 9d.	2s. 5d.	14 candles.	12s. 6d
Blackburn	4 0	3 9	22½ „	14 0
Brighton	3 6	3 6	14 „	17 2
Derby	3 5	2 11	14 „	10 4
Edinburgh (old company)	4 10	4 4½	28 „	19 0
Glasgow (old company)	4 2	3 6½	27 „	17 10
Ipswich	3 9	3 9	14 „	14 0
Leicester	3 6	3 1	14 „	14 0
Liverpool (in borough)	3 0	3 0	22 „	
do. (out of borough)	3 4	3 4		
Manchester (in borough)	3 2	3 1	17 „	13 4
do. (out of borough)	3 8	3 7		
Nottingham (in the town)	3 0	2 9	16 „	11 11
do. (in the outskirts)	4 0	3 9		
Plymouth	2 9	2 9	12 „	16 10
Preston (in borough)	4 2	3 4	18 „	11 4
do. (out of borough)	5 0	4 6		
Rochdale (in borough)	4 0	3 3	21 „	15 10
do. (out of borough)	4 6	3 9		
Salford (in borough)	3 4	3 4	20 „	
do. (out of borough)	4/. to 4/8	4/. to 4/8		
Sheffield	3 6	3 0	14 „	9 7¾
Stockport	3 6	3 0	22 „	16 6
Walsall	2 8	2 4	12 to 14 „	11 4

The select committee of the House of Commons on the Metropolis Subways Bill consists of ten members, five of whom, including Mr. Tite, the chairman, were nominated by the House, and five by the Committee of Selection. The committee met for the first time on Tuesday, the 19th inst., and having appointed their chairman, adjourned to Friday. Before they proceeded to business on that day, Mr. Denison, on behalf of the gas companies, protested against the appointment of Mr. Tite, observing that there was in parliamentary history no precedent for the same person being the promoter of a Bill, a witness for the Bill, a judge, and president of the tribunal. Mr. Tite explained that he brought in the Bill officially as representative of the Metropolitan Board of Works, together with Colonel Hogg, who is also a member of the Board. He denied that he was going to deal with the matter unfairly, and said that he placed the circumstances before the committee, who had not thought fit to alter the appointment. The case was then opened by Mr. Rodwell, who stated the public advantages to be gained by placing the gas and water mains in subways, and said he thought they were so palpable that the *onus* should be thrown on the opponents of the Bill to prove that such a course would be inconvenient. The committee agreed with the counsel for the promoters that the interruption of the traffic caused by breaking open the streets was so manifest that it was unnecessary to call witnesses to prove it, and that it would rather rest with the other side to show that it was not inconvenient. The Bill is petitioned against by eleven of the metropolitan gas companies separately, and by the New River and other water companies. The first witness called in support of the Bill was Mr. Isaacs, the surveyor of the Holborn district, who stated that there had been 5332 openings of the roadways in his district by the gas and water companies in five years. The next witness was Mr. Tarbotton, surveyor to the Corporation of Nottingham, who spoke to the advantages likely to attend the laying of mains in subways, and to his experience of their construction in Nottingham, in which town subways have been made in three new streets. It appeared, however, from his evidence, that the gas company refused to lay their mains in the subways, though without charge, unless the Corporation would indemnify them against any damage that might be caused by explosions of gas. The proceedings were then adjourned to this day, the 25th inst.

The Cheltenham Improvement Commissioners have at length resolved to carry out their previous determination to construct separate gas-works of their own for the supply of the public lamps. We congratulate the gas company on the prospect of being thus freed from supplying those unreasonable and troublesome customers with gas at an unremunerative price, saddled with vexatious conditions. There were only two points in dispute, the first of which was a claim by the commissioners to test the gas, for penalties, without notice to the company, at their own offices, at a distance from the works, by an agent who had repeatedly evinced his hostility to the gas company; and the second was a demand to be supplied with 13½-candle gas tested in the town; the company having offered to supply gas having a minimum illuminating power of 12 candles, though the standard prescribed by their Act is only 10 sperm candles tested at the works. The price at which the company consented to supply the public lamps was also much less than the charge to private consumers; but these concessions would not satisfy the commissioners, and we are glad the company refused to submit to further exactions. It was proposed that the existing contract be renewed for twelve months, to allow the commissioners time to construct their gas-works, and it is probable that they may in the meantime repent of their rash resolution, and accept the very liberal terms offered by the gas company.

The British Association of Gas Managers held a very successful congress at Nottingham on the 11th, 12th, and 13th inst., under the presidency of Mr. Hawksley; but we regret that the crowded state of our columns compels us to defer our report of the proceedings until our next number, when we purpose publishing a special supplement devoted to the meeting. About 80 members attended, and 38 new members were elected, the total number now amounting to 178. Several interesting papers were read, including the continuation by Mr. G. T. Livesey of his communication "On the Practical Working of the Liquor System of Purification;" a paper by Mr. G. Anderson "On the Extraction of Ammonia from Gas, and the Utilization of the Product;" a communication "On the Application of Liquid Hydro-

"carbons as a Substitute for Cannel," by Mr. E. Goddard. Mr. E. S. Cathels read a paper "On Leakage from Gas-"Mains;" and papers "On the Manufacture of Sulphate of "Ammonia," by Mr. W. Esson; "On the Explosive Pro-"perties of Firedamp," by Mr. J. Hutchinson; and "On the "Valves of Purifiers," by Mr. W. J. Warner, were also read. Dr. Letheby, as on former occasions, delivered a lecture to the association, the title of it being "The Utilization of the "Residual Products of the Manufacture of Coal Gas, with "Especial Reference to the Production of Aniline Colours "from Coal Tar." Upwards of 100 members partook of the president's hospitality. It was agreed to hold the congress in London next year, when a large accession to the number of members is expected to take place, as the metropolitan gas managers, who have hitherto kept aloof, will most probably take that opportunity of joining an association which has become one of the institutions of the country.

Register of New Patents.

2400.—Alexander Roger Stark, of Woolwich, in the co. of Kent, engineer, for "*Improvements in the manufacture of gas.*" Patent dated Sept. 18, 1866.

This invention consists in the admixture of other mineral matters with coal during the destructive distillation, in the manufacture of lighting gas, in order to obviate the production of a non or imperfectly combustible deleterious or objectionable gaseous body such as is formed in ordinary gas, or to decompose or convert it into an illuminating gas, whereby the gas resulting from such destructive distillation will be purer and give a far more brilliant light than gas as usually manufactured. In performing this invention there is either placed a layer of additional material (hereinafter mentioned) on the top of the coal in the retort, or it may be mixed intimately with it, or disposed in a series of layers, but it is preferred to place it over the top of the coals. For this purpose, a layer of limestone, ironstone, chalk, earth, or other mineral substance is employed, the effect of which will be to decompose or convert the carbonic oxide generated from the coal during its destructive distillation into an illuminating gas, or otherwise to affect it so as not only to increase the volume of gas generated from a given quantity of coal, but also to much enhance the illuminating power of the whole product.

2415.—Aristide Balthazard Bérard, civil engineer, Knight of the Legion of Honour, of 51, Avenue Montaigne, Paris, France, for "*Improvements in the manufacture of steel and in the apparatus employed therefor, parts of which improvements and apparatus are also applicable to the production of gas for heating purposes.*" (Complete specification.) Patent dated Sept. 20, 1866.

This invention consists of an improved apparatus for the manufacture of steel from cast iron, parts of which apparatus are also applicable to producing gas for heating purposes. The objects proposed by this patent are, first, the purification of cast iron by eliminating from it as completely as possible the forgein bodies it contains, which injure the quality of its products, with the least possible waste; and secondly, the decarburation of the cast iron by a suitable process for its conversion into steel. The improved process is founded on the employment of gases as the agents for the production of heat and as reagents on the liquid cast iron. The principle on which the reactions take place is by effecting a series of successive oxidations and reductions. The chief agents employed are water, steam, and reducing gases (such as hydrogen, carbonated hydrogen, and oxide of carbon), and by putting carbon in contact with the metal by way of cementation.

2428.—Robert Richardson, of Great George Street, Westminster, in the co. of Middlesex, civil engineer, and John Imray, of Westminster Bridge Road, in the co. of Surrey, engineer, for "*Improvements in water supply.*" Patent dated Sept. 21, 1866.

This invention relates to the supply of water from the sea, partly salt for baths, watering roads, fire-mains, and other purposes, and partly fresh for drinking use. To effect this at some convenient site on the sea coast steam-boilers and pumping-engines are erected, with reservoirs sufficiently high to command a flow of water by gravity to the town or district to be supplied. Open conduits are formed from those reservoirs at or near the town or district to be supplied. Steam, which may be direct from the boiler, or partly exhaust steam from the pumping-engines, is condensed in surface condensers, and the fresh water thence resulting is conveyed in the fresh water conduit, and aërated by exposure therein. In order to economize fuel it is preferred to begin with steam at high pressure, to condense that in a surface condenser cooled by sea water, in such limited quantity that it is boiled by the heat given out in condensing the first steam, and thus gives a second supply of steam, which, being condensed in like manner, produces a third supply, which is also condensed, and so on; the first supply of steam being thus used to provide several successive supplies, all of which being condensed, furnish together more distilled water than is supplied by condensing the first steam only. The brine resulting from the first distillation of the sea water is treated, by evaporating and otherwise, for obtaining sea salt, and the other matter contained in sea water. The pumping-engines supply the sea-water conduit, and in order that it may be clean, it is preferred to discharge from the pumps into the bottom of large, deep reservoirs, and to supply the conduit from their upper parts, so that the water, rising slowly in these reservoirs, deposits impurities suspended in it, which are removed from time to time by cleaning the reservoirs. The sea water and distilled water being supplied by the conduits to reservoirs at or near the town or district are thence pumped to such heights as to command the service for different levels. Existing mains and water-works can be supplied with the distilled water, additional service being established for the sea water.

2434.—John Mortimer Heppel, of 2, Storey's Gate, Westminster, in the co. of Middlesex, for "*Improvements in fluid-meters, also applicable to pumps and water-pressure engines.*" Patent dated Sept. 21, 1866.

This invention has for its object the construction of a high pressure fluid-meter, in which the reciprocating piston, actuated by the flow of the fluid, shall work without any leakage, while the said piston is so connected to the inlet-valves that these only begin to open and close the inlet and outlet passages when the piston has arrived at or very near the end of its stroke.

2448.—Thomas Whitaker, of Bolton, and Joseph Constantine, of Manchester, both in the co. of Lancaster, for "*Improvements in the construction of stoves or other heating apparatus for warming and ventilating public and private buildings, baths, hot-houses, and drying-houses.*" Patent dated Sept. 24, 1866.

The invention consists, first, in constructing stoves of hollow segments open towards the inner side, forming, with the lining, slabs and flues for preventing a large absorbing surface for the heat, and a large outer surface for heating the air or other liquids, and possessing great elasticity. Second, in forming the joints of stoves by ramming clay or other substances between ribs at the inner edges of the segments and metal plates, and retained by outer ribs cast on the sides of the segments.

2451.—William Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in machinery or apparatus for filtering liquids.*" A communication. Patent dated Sept. 24, 1866.

This invention relates to the well-known centrifugal filtering apparatus, in which the liquid to be filtered is forced upwards through the filtering medium by centrifugal force induced by the rotation of the apparatus. As heretofore constructed, such apparatus could not be successfully applied to the filtration or distillation of liquors for the want of some means for preventing the escape of the vapour of the liquor introduced for filtration, and for the want of suitable means to prevent the liquor from escaping at the top of the centrifugal vessel by overflow.

The present invention consists in so constructing the apparatus as to prevent the escape of vapour and the overflow of the liquid during the distilling process. In this machine there is no communication with the interior of the centrifugal vessel, except that which is afforded by the pipe through which the liquor is introduced into the inside, and through the filtering chamber through which the liquid is forced by centrifugal force due to the rotation of the apparatus. This invention also includes a disc or circular flange which is employed, and causes the liquor to enter the filtering chamber at a suitably elevated point to compensate for gravitation, which influences the liquid in its passage through the filtering medium.

2457.—James Chandler, of 10, Mark Lane, London, in the co. of Middlesex, engineer, for "*Improvements in apparatus for drawing and preventing waste of water from service-pipes or cisterns.*" Provisional protection only obtained. Dated Sept. 25, 1866.

This invention relates to a peculiar construction and arrangement of apparatus for drawing and preventing waste of water from service-pipes or cisterns, and consists of a self-closing valve enclosed in a metal case, which valve is opened by the pressure of the hand or thumb acting upon a pin from the outside of the said case, which pin presses on one end of a bell-crank inside the said case, the other end of which bell-crank presses upon the spindle of the valve and causes it to open and allow the water to flow into the metal case, the lower end of the said valve being connected to the service-pipe or cistern. The metal case is provided with an opening similar to a common pump-nozzle, which allows the water to flow out into any vessel required; and upon the hand or thumb releasing the pin before mentioned, the valve closes by the pressure of the water acting on the back of it, and assisted by a spring attached to the top end of the valve-spindle, hence the non-liability of the valve remaining open and the prevention of waste of water.

2469.—William Robert Lake, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*Improvements in steam-pumps.*" A communication. (Complete specification.) Patent dated Sept. 25, 1866.

The object of this invention is to produce a steam-pump which by the direct action of steam shall start whenever steam is admitted into the cylinder, no matter where the piston may be, without the aid of starting bars, cranks, fly-wheels, or any of the ordinary appliances for that purpose; also a water cylinder in which the ports shall be free, the valves and all the inner arrangements easily accessible, and by the direct course of the water obviating counter-currents. The details of the invention require to be illustrated by drawings.

2473.—John James Lundy, of Leith, in the co. of Mid Lothian, N.B., colour, grease, and chemical manufacturer, for "*Improvements in the treatment of the residues resulting from and obtained in the purification and distillation of mineral oils, for the purpose of utilising the same.*" Provisional protection only obtained. Dated Sept. 25, 1866.

In manufacturing this improved fuel for heating purposes, the materials mentioned below are mixed in the following proportions, which have been found to produce good results:—One ton of finely sifted anthracite coal, or other screened or pulverized bituminous coal known as duff or culm, 2 cwt. of sawdust, and 40 gallons of heated coal tar or other material, such as the still "bottoms," or residuum left after the distillation of mineral oils.

2483.—Henri Adrien Bonneville, of 24, Rue du Mont Thabor, in the empire of France, and 38, Porchester Terrace, Bayswater, in the co. of Middlesex, patent agent, for "*Improvements in machinery for raising water.*" A communication. Patent dated Sept. 26, 1866.

This invention relates to a combination and disposition of machinery and apparatus for raising water with ease and rapidity and in great quantities, and consists of an apparatus composed of a wheel and axle, and an endless chain loaded with buckets of a peculiar and altogether novel construction, so as to offer the least possible resistance to the wheel and axle in their revolution, by reason of the facility with which they fill themselves.

2485.—John Henry Johnson, of 47, Lincoln's Inn Fields, in the co. of Middlesex, gentleman, for "*Improvements in taps or cocks for water and other fluids.*" A communication. Patent dated Sept. 26, 1866.

This invention relates to an improved and simplified construction of tap or cock suitable for regulating or controlling the flow of water and other fluids, and consists essentially in providing the body of the tap with an internal tube opening into a chamber, also formed on the body of the tap. This chamber has a screwed chamber fitted thereon, through the centre of which passes a screwed spindle provided with the usual handle, which spindle acts upon a cap or valve inside the chamber, and causes it to close down upon the mouth or end of the internal tube in the chamber.

2493.—Thomas Lythgoe, of the city of Manchester, in the co. of Lancaster, builder, for "*Improvements in water-closets, ash-pits, cesspools, and similar places.*" Provisional protection only obtained. Dated Sept. 27, 1866.

The object of this invention is to filter the refuse of water-closets and similar places, so that the refuse liquid which escapes shall be almost pure water, and consequently not liable to pollute rivers or streams into which such refuse runs. This desirable object is accomplished by allowing the refuse to fall on a perforated trap-lid or casing, so that the liquid shall pass through the said perforations into a reservoir under it. The perforations are made conical—that is to say, large or bell-mouthed at one side and small at the other side, which will thus filter the fluid, and by boring or making the said perforations on both sides of the lid or casing it can be used either side up, so that if the holes or perforations become stopped, by turning it they will become opened or cleared. In the reservoir is another filter, similar to the one described, which allows the liquid which has already passed through the first filter to fall into another reservoir, thus making a double filter; and, if found necessary, the number of filters and reservoirs is increased as may be desirable. From the last reservoir a pipe to the flue or shaft of the chimney carries off any offensive smell that may arise therefrom.

2496.—Alfred Vincent Newton, of 66, Chancery Lane, in the co. of Middlesex, mechanical draughtsman, for "*An improvement in the process of distilling petroleum and other oils.*" A communication. Patent dated Sept. 27, 1866.

This invention relates to the introduction of atmospheric air or other gaseous substance during the distilling process of ammonia, the vapours eliminated from petroleum or other oils by the heat applied to the still, for the purposes of expediting the distilling process and improving the quality of the distilled oils.

In the specification of letters patent, dated Jan. 4, 1866, No. 31 (a communication to the present patentee by one of the present communicants), the admission of air into the still during distillation is described. Subsequent experiments have, however, led to the discovery that after the vapours of lighter oils have passed over the still, and the temperature of the still is raised to evolve the vapours of the heavier oils, it is desirable to introduce the air or gas into the goose-neck or exit-pipe of the still, in order that it may not become, by passing too great a distance in contact with the hot vapours, so highly heated as to combine with the hydrocarbon vapours in such a manner as to generate or form ammoniacal gas; and the point of admission of the air or gas requires to be varied as the increase of temperature is continued, in order to shorten the distance between such point and the condensing apparatus.

This invention, therefore, consists in the admission of air or gas into the goose-neck or exit-pipe of the still, and in varying the point of admission to the still and goose-neck or exit-pipe as the distilling process progresses.

2528.—Percival Ashton Batchelor, of 1, Eskdale Villas, Mostyn Road, Brixton, in the co. of Surrey, engineer, for "*Improvements in the construction and arrangement of retorts and settings in combination with machinery or apparatus for the manufacture of coal or other gases.*" Provisional protection only obtained. Dated Oct. 1, 1866.

This invention relates to the employment and adaptation of one or more retorts of cylindrical or other form, composed of suitable material, calculated to bear a high degree of heat, and made to revolve or rotate at any desired speed. By the constant revolution of the retorts the charge contained therein will be continually agitated or turned over and thoroughly and effectively exposed to the action of the heat from the furnace, which is permitted to circulate freely around the exterior of the retorts.

2532.—James Cavanah, of 12, Rake Lane, Liverpool, for "*An improvement in water-closets, cisterns, and soil-traps.*" Patent dated Oct. 3, 1866.

This invention consists, firstly, in the construction of the valve through which the water is conducted to the pan of the water-closet. This valve is so constructed that when at rest it is or may be worked as required by means of a spring and washer, which spring may be made either of steel, iron, brass, india-rubber, or other suitable elastic material, and may be either flat, spiral, or of other suitable shape, in order to press tightly over the valve-pipe and prevent the passage of any water. When the passage of water is required the valve may be lifted by a lever, handle, rod, chain, or other suitable means. The spring and valve may be applied to any part of the cistern, water-pipes, or basin, as may be found most convenient.

The invention consists, secondly, in an improvement in the soil-trap, which may be made of iron, earthenware, or other suitable material. This trap is constructed with an opening in the top or other convenient part of the trap, for the purpose of cleaning it out when required. This opening will be fitted with a lid or stopper, which will be air-tight when fixed, and will be removed when the trap or pipe may happen to become stopped or require cleaning.

2536.—Clinton Edgcumbe Brooman, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the City of London, patent agents, for "*The production and application of an imponderable fluid, together with the apparatus or means employed therein.*" A communication. Patent dated Oct. 3, 1866.

This invention consists, first, in the production and application of an imponderable fluid, termed the vital or organic fluid, such fluid being capable of acting upon the organism of human beings, animals, or vegetables; second, the production of this imponderable fluid by putting in contact azote and carbon, whether an azoted body or a carbonated body, or a body strongly azoted and a body only feebly azoted, or by causing an acid or an alkali to act on an organic matter, or by making an acid or an alkali to react on a hydrocarburet or on carbon; and third, the apparatus or means for producing the imponderable fluid.

2537.—Matthew West, of Stevenage, in the co. of Hertford, tailor, for "*Improvements in fishtail gas-burners.*" Patent dated Oct. 3, 1866.

This invention relates to gas-burners, and consists of an improved nipple and flame augmenter, which latter may be added to the ordinary burners. In carrying out the invention, it is preferred to make the nipple and flame augmenter together, so that they may take the place of ordinary burners by simply unscrewing the latter and screwing in the improved nipples and flame augmenters in place of the former. The flame augmenters, however, can be so formed that they may be added to the ordinary burners. The improved nipple is formed with a hollow enlargement near the top of the flame augmenter, which consists of a small arch, arc, or crown chamber on the outside thereof, and passes over it a short distance above the orifice or orifices from which the gas or inflammable vapour issues; the wire is so placed that the flame impinges against it, and the light is thereby increased very considerably without increasing the consumption of gas. When it is desired to apply the light augmenter to an ordinary nipple, it may be made with a clip ring or claws, both being sufficiently elastic to cause them to hold the arc or crown securely in position, and at the same time to admit of its being accurately adjusted as required.

2552.—John Wolstenholme, of Radcliffe, in the co. of Lancaster, and Thomas Pendlebury, of the same place, for "*Improvements in tube and bar cutters, and in apparatus connected therewith.*" Provisional protection only obtained. Dated Oct. 4, 1866.

This invention consists chiefly in making the centre portion of a wrench with two projecting parts, into one of which is placed two rollers, or a recess to receive the tube or bar of metal to be cut. On the other side of the same projecting part is fixed a handle, forming one handle of the wrench. On the middle bar, from which the said projecting parts proceed, is placed a sliding block, acted upon by another handle screwed through the other projecting part; the last-named handle will, by being turned by the hand, or other appliance, cause the before-named block to advance to or recede from the two rollers before named as may be required. The sliding-block carries a tool-box having a cutting-tool, moveable in a slot, and set fast, or loosened by a set screw. The tool-box has a projecting part in front of the cutting-edge of the cutting-tool, also another projecting part which fits into a groove or slot, situated in the before-named sliding block, and is moveable on a pin passed through the same. The tube or bar to be cut less in diameter is placed against the two rollers or braces before-named, and the cutting-tool is pressed against the opposite side of the bar or tube, and the said projecting part of the tool-box, in front of the cutting edge of the tool, is also pressed against the bar or tube to be cut by means of the handle before named, when, by turning the wrench round, it cuts the bar or tube to a less diameter, and prepares it for receiving a thread thereon, whereby the process of filing is dispensed with, and the tube or bar, where required, is screwed in a much less time than in the ordinary way.

2556.—John Ambrose Coffey, of 32, Great St. Helen's, in the City of London, consulting engineer, for "*Improved mechanical contrivances applicable to syphons, also adaptable in the production of pumps of improved construction.*" Patent dated Oct 4, 1866.

This invention relates to drawing off liquors from reservoirs, tanks, and receptacles for water or liquids, whether on the same level as, or elevated above, or situated beneath, the point of required discharge, and is particularly applicable to all kinds of syphons, whether used for hot liquids, acids, or otherwise. For the above purposes a flexible, vulcanized india-rubber tube is employed, outside of which is a travelling frame, containing a pair of rollers or other pressers, whereby the air is expelled from the tube, beginning near the point where one end of the tube is inserted (or to be inserted if the pressing operation is performed previous to placing the tube in the water or liquid) in the reservoir, tank, or vessel containing the same. The pressure is to be continued up, and close to the next end, and the travelling frame is provided with a regulator screw for keeping the rollers or pressers well pressed together, so as not to allow any liquid to pass until the unscrewing action is resorted to, whereby the action of a drawing-off cock or tap is resorted to.

APPLICATIONS FOR LETTERS PATENT.

1668.—Thomas Sturgeon, of Manchester, in the co. of Lancaster, engineer, for "*An improvement in street and similar lamps.*" June 7, 1867.

1671.—Augustus Lea Brickneli, of Stratford-on-Avon, in the co. of Warwick, for "*Improvements in rotary pumps.*" June 7, 1867.

1673.—Henry Crow, of the city of Manchester, in the co. of Lancaster, engineer, for "*Improvements in hot water apparatus for heating and warming purposes.*' June 7, 1867.

1684.—James Warburton, of Hythe, in the co. of Kent, for "*Improvements in apparatus for registering and recording the quality of gas.*" A communication. June 7, 1867.

1694.—Nathan Thompson, of 15, Abbey Gardens, St. John's Wood, in the co. of Middlesex, for "*Improvements in unions or apparatus for connecting together pipes or tubes, and for stopping the ends thereof.*" June 8, 1867.

1710.—Henri Adrien Bonneville, of 38, Porchester Terrace, Bayswater, in the co. of Middlesex, and 24, Rue du Mont Thabor, Paris, in the empire of France, patent agent, for "*Improvements in vessels, more particularly such as are used for the reception or deposit, or both, of offal, excrement, urine, or other fœcal or waste matter or substance.*" A communication. June 11, 1867.

1748.—George M'Kenzie, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in the manufacture of illuminating gas.*" June 15, 1867.

1791.—Ebenezer William Hughes, of 5, Queen Square, Westminster, and Thomas Howard Head, of 9, Dowgate Hill, in the City of London, for "*Improvements in rotary engines and pumps.*" June 19, 1867.

GRANTS OF PROVISIONAL PROTECTION.

1529.—Ebenezer William Hughes, of 5, Queen Square, Westminster, and Thomas Howard Head, of 9, Dowgate Hill, in the City of London, for "*Improvements in rotatcry engines and pumps.*" May 22, 1867.

1530.—Frederick Hardwick Johnson, of the firm of Cotton and Johnson, of Grafton Street, Soho, in the co. of Middlesex, for "*Improvements in gas blow-pipes, and in blow-pipe torches or flames.*" May 23, 1867.

1560.—Henry Bernoulli Barlow, of the city of Manchester, patent agent, for "*Improvements in apparatus for coupling pipes.*" A communication. May 27, 1867.

1561.—Herbert Frost, sen., and Herbert Frost, jun., both of the city of Manchester, machinists, for "*Improvements in apparatus for measuring fluids, which improvements are also applicable for obtaining motive power and for pumping.*" May 27, 1867.

1628.—Anton Georg Schaeffer, of Gloucester Street, Newcastle-on-Tyne, for "*Improvements in obtaining increased light in the combustion of illuminating matters.*" June 1, 1867.

1668.—Thomas Sturgeon, of Manchester, in the co. of Lancaster, engineer, for "*An improvement in street and similar lamps.*" June 7, 1867.

NOTICES TO PROCEED.

227.—William Henry Stallard, of Mera Lodge, Bexley Heath, in the co. of Kent, for "*Improvements in the means and mode of admitting and regulating atmospheric air or vapour to gas-burners.*" Jan. 28, 1867.

343.—William George Beattie, of South Bank, Surbiton, in the co. of Surrey, engineer, for "*Improvements in slide-valves.*" Feb. 7, 1867.

358.—William Septimus Losh, of Wreay Syke, in the co. of Cumberland, for "*A method of manufacturing a salt or salts of ammonia.*" Feb. 8, 1867.

359—Arthur Ormsby, of 19, Parliament Street, in the city of Westminster, civil engineer, for "*Improvements in the collection and storeage for distribution of rain water.*" Feb. 8, 1867.

383.—George Hugh Kidd, of Merrion Square, in the city of Dublin, doctor of medicine, for "*Improvements in apparatus for regulating the supply of water to cisterns, and for preventing the bursting of water-pipes.*" Feb. 11, 1867.

1045.—William Bobert Lake, of 8, Southampton Buildings, Chancery Lane, in the co. of Middlesex, consulting engineer, for "*An improved combined water-meter and force-pump.*" A communication. April 6, 1867.

1335.—Eugène Bourdon, of 36, Rue de Malte, Paris, in the empire of France, engineer, for "*Improvements in valves for regulating the flow of liquids, gases, and other elastic fluids.*" May 7, 1867.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1396.—Henry Hill, "*Improvements in the manufacture of taps and cocks.*" June 4, 1864.

1416.—John Beck, "*Improvements in water-closets, lavatories, urinals, valves, and stench-traps.*" June 7, 1864.

1456.—William Sharp, "*Improved means or apparatus for purifying and increasing the illuminating power of gas.*" June 13, 1864.

1473.—Patrick Benignus O'Neill, "*Improvements in sluice and other cocks, valves, and taps.*" June 15, 1864.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

1412.—Alexander Angus Croll, "*Improvements in the purification of gas.*" Jnue 8, 1860.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, June 17.

The following Bills have received the Royal Assent:—

The Farnworth Park and Improvement; Rochester, Chatham, and Strood Gas; Cambridge Gas; Huyton and Roby Gas; Richmond Gas; Sheffield Water (Amendment); Bingley Extension and Improvement; Dartford Gas; Great Grimsby Gas; Birkenhead Improvement Commissioners; Sheffield Water (New Works); and the Stockport Corporation Water Bills.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the East London Water (Thames Supply), and the East London Water (Various Powers) Bills, have been complied with.

The Weymouth Consumers Gas Bill was returned from the Commons, with the amendments agreed to.

Petitions were deposited against the East London Water (Thames Supply) Bill, from the Great Northern Railway Company, and from the Grand Junction Water-Works Company; and against the East London Water (Various Powers) Bill, from the Trustees of the River Lea, and from the inhabitants of Higham Hill.

Tuesday, June 18.

The Widnes Gas, Water, and Improvement; the East London Water (Thames Supply); East London Water (Various Powers) Bills, were read a second time, and committed.

The Dundee Gas, and the Dundee New Gas Bills, were returned from the Commons, with the amendments agreed to.

The Crickhowell Gas and Water Bill was reported, with amendments.

The Wolverhampton New Water, and the Wallasey Improvement Bills, were referred to a Select Committe, consisting of Earl Romney, (chairman). Earl Sandwich, Earl Camperdown, Lord Camoys, and Lord Wenlock, who will meet on Friday next, at eleven o'clock.

Thursday, June 20.

The Widnes Gas, Water, and Improvement Bill was reported, with an amendment.

The following Bills have received Royal Assent:—the Weymouth Consumers Gas; Dundee Gas; and the Dundee New Gas Bills.

The Leeds Corporation Water Bill was referred to a Select Committe, consisting of Lord Penrhyn (chairman), Lord Clinton, Lord Suffield, Lord De Manley, and Lord Hartismere, who will meet on Wednesday next, at eleven o'clock.

Friday, June 21.

The Kirkcaldy and Dysart Water Bill was reported, without amendment.

The Southport Water Bill was returned from the Commons, with the amendments agreed to.

The Crickhowell Gas and Water Bill was read a third time, with the amendments, and passed, and sent to the Commons.

The Wolverhampton New Water Bill was reported from the Select Committee, with amendments.

HOUSE OF COMMONS.

Thursday, June 13.

The Metropolis Subways Bill.—Petition of the East London Water-Works Company, to be heard by counsel against the Bill, referred to the Select Committee on the Bill. Counsel ordered.

Friday, June 14.

The Weymouth Consumers Gas Bill.—The Lords amendments were agreed to.

The Water Supply Bill.—Report in respect of non-compliance with the Standing Orders laid upon the table, and referred to the Select Committee on Standing Orders.

Monday, June 17.

The Metropolis Subways Bill.—Petitions to be heard by counsel against the Bill, from the Southwark and Vauxhall Water Company, Grand Junction Water-Works Company, Chelsea Water-Works Company, London Gaslight Company, Independent Gaslight and Coke Company, City of London Gaslight and Company, Phœnix Gaslight and Coke Company, Surrey Consumers Gas Company, and the New River Company, were referred to the Select Committee on the Bill. Counsel ordered.

Tuesday, June 18.

The Dundee Gas, and the Dundee New Gas Bills.—The Lords amendments were agreed to.

The Abertillery Gas and Water; Lampeter, Llandyssil, &c., Gas; and the Risca and Pontymister Gas Bills, were reported, with amendments.

The Metropolis Subways Bill.—Petitions to be heard by counsel against the Bill, from the Western Gaslight Company, Great Central Gas Consumers Company, West Middlesex Water-Works Company, and Lambeth Water-Works Company, were referred to the Select Committee on the Bill. Counsel ordered.

Wednesday, June 19.

The Metropolis Subways Bill.—Petitions to be heard by counsel against the Bill, from the Gaslight and Coke Company, and Equitable Gaslight Company, referred to the Select Committee on the Bill. Counsel ordered.

Thursday, June 20.

The Southport Water Bill.—The Lords amendments were agreed to.

The Metropolis Subways Bill.—Petitions praying to be heard by counsel against the Bill, from the Imperial Gaslight and Coke Company, and South Metropolitan Gaslight and Coke Company, referred to the Select Committee on the Bill. Counsel ordered.

HOUSE OF COMMONS.

METROPOLIS WATER SUPPLY.

FOURTH DAY — FRIDAY, MAY 17.

Mr. *Simpson* recalled, and examined by the COMMITTEE.

The CHAIRMAN: I think you gave us your opinion as to the practicability of storing the surplus or flood water of the Thames in the valley of the Thames above Hampton.

Witness: Yes; the probable expenditure that it would be necessary to incur in storing water to any large extent in the valley of the Thames above Hampton would depend entirely upon the magnitude and number of the reservoirs. I have not considered the subject so as to be able to give you any general ideas about it without going into technical details. I have considered it further than going and visiting the spots. The general conclusion at which I have arrived is, that I thought that if we could get four or five reservoirs at an expense of about £250,000 it would be sufficient. We should then be able to store about 50 millions of gallons for 100 days.

The CHAIRMAN: That would be 500,000,000,000 gallons?

Witness: Yes; but I think many years would pass by before that would be requisite, for there is always a great quantity of spring water in the Thames; very large quantities come from the oolite; the Oxford canal is supplied with that water. There is no doubt that would render the magnitude of the reservoirs less; and until the companies take a larger quantity of water, and more than they do now, the reservoirs would be unnecessary. When the river is low, the valley of the Thames gives back into it a large volume of water. The valley having been in flood at certain times, there is a greater amount of water stored in the soil; but of late years the operations of surface drainage have diminished that to some extent. A large portion of the valley is under water in times of flood at the present time. A great quantity of that percolates into the soil, and it gives it out slowly—that is, into the bed of the river when the water is low. That is the reason which I think accounts for the stream being so perennial as it is—that in addition to the constant springs from the nature of the stratification. In that season of the year the water so given out is very pure, it having so come from the soil. In dry seasons the character of the water would be purer than in a season of flood; but there is a canal near Cirencester, and there it is the reverse of most of the canals in the country, for there the reservoirs are underground, and they pump the water in the dry seasons in order to maintain their lockage. They have a very large engine near to Cirencester with which they pump in dry seasons. I have had my attention directed to the difference in the quantity of the house supply in the case of the two companies with which I am connected, and I have observed that one company supplies 8 million gallons to 26,000 houses, with an estimated population of 170,000 persons; and the other company supplies 8,950,000 gallons to 37,000 houses, with a population of 250,000 persons. I should think there must be a large proportion of smaller houses in that district—the Lambeth district. The other district is the Chelsea. It is on account of the largest proportion of small houses that the supply is so much less per house per head. I think that in that district the inhabitants are away from home all day, and there is not so much water used. There is a considerable difference in the consumption of water in the larger than in the smaller houses per head, from the circumstance that the inhabitants are not at home to use it. And, again, there are but few baths in small houses. Baths, however, are becoming very universal now down to houses of only eight rooms. A great number of small houses are without water-closets, but the local boards have been compelling the construction of them. I do not consider that the Lambeth supply is insufficient in quantity at the present time. Whenever there is any complaint made of want of water our attention has been directed to it, and the board are very anxious upon that point in every case. The pipes have been enlarged, and a great deal has been done since the Act of 1852. I have thought of a variety of ways as to what would be the best mode of arranging to supply all the small houses with water, and I believe that the only way to do it effectually would be to have a constant supply from the mains by pipes laid down purposely. I do not think it would be advisable to have it without cisterns entirely, but no doubt a very efficient supply could be given by that means. I mean that it would be requisite to provide cisterns for water-closets, but I would treat the subject irrespective of water-closets, and say for really the strict domestic consumption. I think it would be an advantage to have a few gallons of water to fly to in case of need, independently of the companies, and would have separate cisterns in the larger class of houses; now and then, from the position of them, it is not a nice thing to have a cistern over the water-closet to draw the general supply from. We recommend in all cases separate cisterns. I would have a cistern for the water-closet in each house, and a separate tap kept constantly supplied for drinking purposes. I have thought that it might be done in many cases by putting one general tap for ten or twelve houses, but there is so much objection, and it is commented upon in the report on the health of towns, to the assemblage of persons in the street, because it leads to so much disorder, I think it ought not to be encouraged, but should be done away with, and that they should have the water provided within their own doors. I would pass a pipe through the wall of the houses, and give a tap to each, and, if possible, I would have that pipe go through the premises supplied, and no other; but there are so many difficulties, for where there are people drawing water from the same pipe, they spite each other, and they take the water when they ought not. I certainly see one difficulty in an arrangement being made by which all these houses might be supplied with water, because in some of the districts we cannot let the water remain on without great risk of flooding the properties. The drainage is by no means complete at the present time. The Metropolitan Board have carried it out to a certain extent, but by the district boards there is a great deal still to be done in details. Chelsea is not complete, and Westminster has done very little, too; and there are many places where we should do injury to property to let the water remain on. In those cases it must remain without. There must be very strict supervision of the water; perhaps by shutting off the water at night we might overcome the difficulty. A great deal of co-operation is wanting on the part of landowners and occupiers of houses, and the company must have more power than they have for inspection, and so forth. But then comes the question as to who is to be at the expense of all this. In the case of men who own houses under a one or two years lease, or the remanet of the lease, you cannot expect them to go to an expense of £8 or £10. It is a difficult subject to deal with. The fact is, that there are many cases in Westminster and Chelsea where there is great difficulty to collect any rents to support the houses at all, and you hardly know what is to support them; perhaps the parties get the rent in one week, and then in two or three weeks they do not get it.

By Mr. HEADLAM: With regard to the cisterns from which the water-closets are supplied, the impurity rises to the cistern from the water-closet. It gets into the cistern, and if it is a covered one it becomes most offensive when you take off the cover. All that is done in a bad way. They take the waste-pipe into the drain without trapping it, and the effluvium comes from the drain as well, and it is very faulty to have it so. I consider it is very objectionable to take any water from the cistern of the water-closet for any other purpose.

By Mr. KEKEWICH: There is a great overflow of the Thames at different times in floods, which is in consequence of the lowness of the banks and the weirs chiefly. The banks are very low, and the stream is not large enough to take the highest floods. Although that, in a sanitary point of view, may be prejudicial to the health of the inhabitants, or to agriculture, yet I think, as far as the supply of water is concerned, the whole of that is returned again in dry seasons to the bed of the river. The bed of the Thames contains very large tracts of gravel and porous strata which fill up, and then give out for many weeks after a flood. In fact, that overflow is very beneficial, with reference to a supply of water in dry seasons. With regard to cisterns, I think it is possible to place one large cistern for the supply of a block of houses. It is frequently done; we have several cases of the kind. The plan answers well to some extent, but sometimes the parties quarrel, and let the water run to waste. Generally speaking, it is a good mode of supplying houses—I mean poor houses. Where the expense would be very great there would be a separate cistern to each house. Not only as to the expenses, but from the way in which small houses are constructed, it is advisable to have the cistern outside; but latterly, where the Lambeth Board have enforced the establishment of water-closets, they are obliged to introduce them in many instances. I have visited the large lodging-houses which have lately been erected by Mr. Waterlow in the City of London. I believe in many cases they have a cistern on each floor. We have one of those lodging-houses in our district at Chelsea —Miss Burdett Coutts's—and they have cisterns there for each floor, they are supplied with water, and the water is constantly on. But our observation leads to this—that since the house has been rather more fully occupied than at first, they use nearly 7¾ gallons per head per diem. According to the Metropolis Water-Works Act, the company have power to approve of the cistern, amongst other things, and they need not take the water on till it is done. I think there would be a great saving of water if the cistern was universally adopted. I think there has been a very great mistake made upon this point; I mean in supposing that these cisterns are so filthy. It is not the result of our observations that they are so; there is no doubt that many negligent persons have little butts that they never clean out, but, generally speaking, and particularly since the introduction of filtered water, great attention has been paid to the cleaning out of cisterns—and, indeed, in the case of club-houses, and such places, there is an annual contract with the plumber to do it. I am well acquainted with self-acting water-closets. There are a great number of them in our district. They are very economical in respect to waste of water.

By Colonel HOGG: I am in favour of a constant supply of water in the poorer districts, and I would go great lengths to give it, but you cannot always do as you wish. I certainly would not give cisterns up, if we had a constant supply. I think it is possible that arrangements might be made for the inspection of cisterns, in order that they should be kept clean.

Colonel HOGG: Would you give that power to the local authorities, or to the inspector of the water company?

Witness: I have a strong opinion upon that, that if it were done by those whose business it was to do it, it would be better attended to; and some inspection of that kind no doubt is desirable.

Colonel HOGG: You would put that duty on the inspectors?

Witness: Yes.

Colonel HOGG: Would there be less labour and cost occasioned by a constant supply than by an intermittent one?

Witness: That depends entirely upon how it would be carried out. It is a good plan, with this remark, that we must have the waste defined before we can know what the cost will be. I believe in strictness that a constant supply ought not to be attended with greater expense.

Colonel HOGG: Are not the pipes less liable to damage from being constantly full than from being sometimes full and sometimes empty?

Witness: If they are strong enough at first, we do not know that they require anything to be done to them, and they will go on from year to year as they do now; but the difficulty is in dealing with the pipes as they are now, and in changing the system they must be stronger than they are now. There is no doubt that in the case of fires hydrants are very useful—that is, if we could keep them in order—but that is one of the difficulties in London, in consequence of the great crowds in the thoroughfares, and the great traffic that there is. It is not obvious at first that they would answer—they would be very expensive. They are used in Manchester. Wherever there is pressure they save the fire-engines very much. The reason that they do not answer in London as well as in Manchester is, that the streets in Manchester in many cases are much quieter than the streets in London. I think they would be useful. I can give the committee no advice as to the matter of cost which is entailed upon the companies in opening the streets. I have no opinion of subways. The fact is, I do not know how you are to apply them.

Colonel HOGG: If a pipe were once laid in a subway, it would be much less trouble to get it out if necessary than to take it up out of the street?

Witness: It is not that class of pipe that we dig down to. The larger part of the operations in London are in the case of leaden pipes, and with respect to the fire-plugs. No doubt it is easier to get at a pipe in a subway than to take up the street, but I do not know how you apply the pipes in subways. For instance, take Parliament Street. There are about 17 or 18 lines of pipe, and I do not know how you are to get them into a subway.

Colonel HOGG: I am supposing that there is a subway that would hold the pipes. Would it not be more convenient to have them in a subway than to have continually to break up the streets to get at them when necessary?

Witness: Yes; if you can keep the gas out.

Colonel HOGG: Supposing the gas is not there?

Witness: That is, I think, impossible; for in London, according to my experience, the gas gets into every open space. There is not a surface into which it has not percolated many feet; and, in fact, the whole of the substrata of London has been affected by gas.

Colonel HOGG: Would it not be less affected supposing the subway was ventilated?

Witness: The gas would come out.

Colonel HOGG: Would it come out at places properly ventilated?

Witness: No; there is a great difficulty indeed in ventilating sewers and subways. It is a subject upon which I have thought a great deal. I was consulted by the Danish Government for Copenhagen, and I went into it very particularly there. They had an idea that by putting up plenty of shafts that would do it, but it did not. The foul air remains in, and so far as carbonic acid is concerned it will remain in, and you cannot move it. It is a difficult question. Nothing in England is more difficult than ventilating houses, even where you have every appliance.

The CHAIRMAN: I suppose that all ventilation depends upon changing the

balance of the air; and the temperature varies so very much that it is impossible that any one system can answer for the different states of the climate?

Witness: Yes; you may make use of any means, but the difficulty is to make the draught. It is not a shaft stuck up which will cause motion.

Colonel HOGG: Then you have never laid any water-pipes in subways yet?

Witness: I have seen them, and I know that in Paris, when I was there waiting to investigate them, for three weeks we could not get into the sewers on account of the gas. The ventilation was pretty good as far as the openings went, but you cannot move.

The CHAIRMAN: You must use mechanical means, I presume, to move the air?

Witness: Yes; and then it is an exceedingly difficult thing, if you can only conceive that there are hundreds of miles around London to ventilate. They tried it, and everybody supposed that they would do it by connexion with the furnaces of the soap-works; but the result was, that they went to work at about nine o'clock in the morning, and the pressure of gas coming on about four o'clock, it filled everything up, and eventually reached the sewerage, which was working into the furnace, and an explosion took place, which blew all the furnace down. This was at soap-works in the borough of Southwark. One of the most difficult questions I know is the ventilation of that class of buildings and of subways.

Mr. BENYON: But in Paris the gas-pipes are not now in the subways, are they?

Witness: They have been removed, I believe. The water-pipes remain.

Mr. BENYON: But if the water-pipes in London were to be the only pipes in the subways, the expense of the subways would fall entirely upon the water companies, would it not?

Witness: Yes; and I very much question whether the opening of the water companies on their own pipes would be worth while, because it is really a bagatelle. In the Chelsea works it does not cost £200 year. It would be the mains, of course, that would be put into these subways. There were a variety of means discussed for the purpose of getting those large pipes into the subways. The principal were to make lateral openings to carry them down, and to make, in some cases, long openings in the top, which, of course, would be attended with enormous expense, and not only that, but it would be very inconvenient to open at any time; they would be much larger than the common openings, many of which are done between five o'clock, in the summer, and ten o'clock. Those holes, of course, would have to be made through brickwork, which would have to be restored, and which would be a greater expense than removing the ordinary pavement of the streets, unless you had a covering of iron, which would be more expensive.

Colonel HOGG: Why could not the water-pipes come in at the end?

Witness: There is such difficulty in getting them along the end of the sewer; where you have half a ton weight you require considerable means, and you want room to do it.

Colonel HOGG: Are you not aware that in Southwark Street there are pipes now laid through the length of it in a subway?

Witness: There are small pipes there, and I understand that they have been laying some more as an experiment, but up to this time that cannot be received as anything else but as an experiment.

Colonel HOGG: But have you not had to lift up the subway to get those pipes in?

Witness: It is evident that they must have holes to get in. They built that sewer without putting in any pipes at all.

Colonel HOGG: Then they put in the pipes after it was built, without breaking it open, did they not?

Witness: They are not pipes in connexion with works; it is a mere experiment; it is a mere trial. I do not think that anything very practical has been proved yet.

Mr. BENYON: The floods are greater in Oxford and in that county than they used to be, are they not?

Witness: I believe they are. What is described as the shoot of water after rain is much quicker from the direct drainage. The silting up of the bed of the river may have something to do with it. All those streams are filling up, and this may be the case of the Thames exactly, and therefore it would produce an apparently greater quantity of water, though in reality the quantity remains much about the same. Our celebrated engineer—Smeeton—made that observation on the Thames itself when he was talking about the Thames being cleared by floods. He said that it would probably take as long to clear it as it would to accumulate, and that must have been going on for 700 years. I do not mean to assert that the existence of fish in the water is a direct proof that the water is pure and good for human beings. It must be taken with some modification, but, generally speaking, you will find that fish like pure water. I think that the instance is notorious in this river. We have fish now up the river, coming since the drainage has been taken below. I do not mean as a general proposition that the waste of water by the intermittent supply was greater than the waste by the constant supply. I should say that it is entirely as you deal with either supply. In many cases it has become greater in one than in the other. In the case of Boston, U.S., it had got up to 97 gallons per head per diem with the constant supply, and at New York they actually took the whole quantity which was appropriated for four times the population. I attribute that to absolute waste and to the improper use of the water by the inhabitants. Where the fittings for the constant supply are in perfect order, and those for the intermittent supply are in perfect order also, the loss by waste would be much about the same. I do not believe there would be a very great deal of difference. There were no existing water-works at Carlisle when I was employed as an engineer. Ours were an additional introduction of works. There were no alterations to be made, and that rendered the application much less expensive.

Lord F. CAVENDISH: The chief objection against the constant supply is the danger of waste?

Witness: Yes.

Lord F. CAVENDISH: Is there any insuperable difficulty in measuring the quantity of water supplied to each house?

Witness: Meters have only been perfected for the last seven or eight years, and we have not been able to get a small meter that we can rely upon. If we require to measure 15 gallons an hour, we cannot do it. There is no reliable meter that I know of that would do that. It would be a difficult problem, and an expensive one too. In many cases it would amount to double the water-rent of the house. If the manager of the company suspected the water was being wasted in a particular house, he had not the power to put up a meter and charge extra for excessive waste. We are not in a state to do so until we get a more perfect meter for small quantities. To charge the public extra would, I think, give great dissatisfaction. An enactment of that kind would lead to great complication, because the contract, in many of the small houses, is made by the landlords, who pay for the houses whether they are full or empty, and they get a deduction of, say, 20 per per cent. discount, and they would not be the parties to proceed against in case of waste of water.

The CHAIRMAN: Why should not iron fittings be used instead of brass?

Witness: In many cases iron fittings are used, but the water in a wrought-iron pipe rusts, and in many cases it is not manufactured in a very good way; it is a common gas-pipe, and sometimes it is so thin that it will not bear pressure.

The CHAIRMAN: Have you examined the system which is in force in the East-end of London of measuring a piece of pipe which is introduced?

Witness: I have not examined it, but I have heard it spoken of, and I have seen the apparatus. I think it is one which the public would not be satisfied with; they require to draw larger quantities at a time than that would admit of. I have never thought of admitting any less than a one-eighth of an inch pipe, and more frequently a quarter of an inch pipe. That admits of a large amount of waste beyond the ordinary consumption of a house. At Cardiff they are complaining very much of the waste of water. It is delivered there through an orifice as a constant supply. Most of the pipes are half an inch, and in some cases three-quarters.

Mr. *Joseph Quick*, examined by Mr. CLAY.

I am engineer to the Southwark and Vauxhall Water Company, and also to the Grand Junction Water Company, and have had considerable experience in the construction of water-works. In the former company I have acted as engineer 30 years, and for the latter 20 years. I confirm the statements made in the returns of either companies. Before the passing of the Metropolis Water Act of 1852, the Southwark Company obtained their supply from the Thames at Battersea, but by that Act they removed the source of supply to Hampton. I should think the existing power of the company for obtaining water will meet the requirements of the next 40 or 50 years. We have had no request made by the inhabitants for a constant supply under the Act of 1852. The supply at present is practically constant, if the cisternage is sufficiently large. The poorer dwellings, for the want of proper cisterns, are very much distressed at times. We have a very large number of poor dwellings in our district, and I have made several suggestions to the landlords from time to time to amend the condition of those poor houses with regard to their water supply, but there is always difficulty in getting them to lay out any money for the improvement of their cisternage or storeage of water for the poor. I have suggested to them a cistern as an auxiliary supply. [Witness handed in a sketch of a cistern.] I should leave the present tanks and butts, or whatever they may have, at the back of the house, as an auxiliary, and have a large auxiliary cistern for the service of all the houses. I have communicated this plan to all the vestries in the Southwark Company, but it has not been adopted, though they approved of it, and thought it was an excellent plan. There was no one that would find the money for it. The expense would be about £7 or £8. The Southwark Company gives a Sunday supply to a very large proportion of their district. We could give it wherever it was asked for. There have been two complaints under the 9th section of the Act of 1852 from the parish of Bermondsey. After some very heavy floods the water became a little discoloured, and Captain Tyler was appointed by the Board of Trade to examine into the cause of it, and after visiting the district and also the works, he suggested that some addition should be made to the company's filtering-beds, and that was immediately carried out, and since then there has not been any complaint. We made the additional filtering-bed, which remedied the defect. Captain Tyler condemned the fittings of the houses, and said they were so bad that he was not at all surprised at our occasional deficiency of water. His inspection included the fittings in some of the houses of the memorialists themselves.

By Mr. CLAY: A memorial has been presented to the Board of Trade by the inhabitants in the higher portion of Peckham, to the effect that they could not get a proper supply, in consequence of the great waste in the lower parts. Captain Tyler recommended the company to put down an additional or special main for that district, which was done, and since then the inhabitants have been properly supplied. No penalty has been laid on that company under the 16th section of the Act, neither has there been any prosecution against them under the 20th. Before the passing of the Act of 1852 the Grand Junction Water-Works Company obtained their supply from the Thames at Kew Bridge. Kew is a sort of distribution for the company's entire district. The water destined for the highest part is pumped from Kew into a reservoir on Camden Hill, Kensington, and then re-pumped to a higher level for the houses on the north side of the Uxbridge Road. The company have acquired additional land besides that occupied by their works at Hampton and Kew, and Camden Hill. They have acquired land at Shootup Hill, in the upper part of the Edgware Road, for high-level services when required. That is 266 feet above Trinity high-water mark. No demand for a constant supply has ever been made upon the company. The cause of that, in my opinion, is, that the houses are so well provided with cisterns that they do not require it. The houses are of a very good class, and they have all the fittings and all the appliances necessary for storing water. I think, therefore, that a change in the existing system of supply would not be acceptable to the inhabitants of the Grand Junction District. We give a supply on Sunday, whenever it is asked for. No complaint has been made to the Board of Trade as to the quantity or quality of the water supplied by the company, and no penalty has been inflicted on them under the 16th section, or prosecution taken against them under the 20th section of the Act. As to general case, I confirm Mr. Simpson's evidence as to the flow of water in the Thames being more than ample to supply the water companies for many years to come. Both the companies with which I am concerned very readily acquiesced in the arrangement under the Thames Navigation Act of last year, by which they were to pay £1000 a year each in common with the other Thames companies for taking their supply from the Thames. The benefit they will derive from the passing of the Act will be that the Thames will become purer from being better looked after, and drainage will be prohibited from passing into it, and no doubt the water will become purer every year. I think the operation of the Act will add to the capacity of the water in the river as a source of supply. I think it would exceed the amount named by Mr. Simpson to change from the intermittent to the constant supply system. I think it would be nearer £10 per house. I think the change would necessitate the abolition of the present fire-plugs. It would be necessary to put hydrants with proper stop-cocks to prevent the plugs going out of the mains. In the Southwark and Vauxhall district there are between 9000 or 10,000 ordinary plugs, which probably might be reduced to 9000, and taking them at £10 a piece, that would be £90,000, and in the Grand Junction district there are about 6000. That would be £150,000 altogether. I think that a strict system of supervision would be requisite to carry out the constant supply, or else the waste would be so great in the lower parts of the district that the upper parts would never receive any water at all. I do not think it would answer in London; it might be made a matter of necessity.

Mr. DENISON: I have now the report which has been asked for, and I may begin by putting this before you. The first letter that appears here is a

letter from the Board of Trade, of the 26th of December, 1863, requesting the Vauxhall Company to do certain things. That is so, is it not?

Witness: Yes.

Mr. DENISON: Then the next document that appears here is a memorial that was presented; and then we have a longish report from Captain Tyler, the one which you referred to, in which he says in substance, I think, "their filtering-beds are not sufficient."

Witness: Yes.

Mr. DENISON: Then, with regard to specific complaints, this sort of summary may be given: In a certain district it was found that there was an insufficient supply of water, and the reason appeared to be that the main entering the yard had got flattened, I suppose, by mischief. Was that so?

Witness: Yes.

Mr. DENISON: Then there was another comparatively minor complaint, that in two courts—or, at least, a court with a yard attached to it—there was only a supply on alternate days.

Witness: That was the representation, but the supply was given every day, including Sundays.

Mr. DENISON: Then another was about insufficient supply, which did not receive much corroboration, that the houses had neither ball-cocks nor taps, and consequently all the surplus water beyond what was sufficient to fill the cistern must run to waste. The Sunday supply, he said, was given to the poorer districts.

Witness: Yes.

Mr. DENISON: Then I think the next thing was that the house proprietors were very much to blame for not supplying the proper fittings, and that the company had no power to compel the householders to do it, and Captain Tyler then suggested a remedy for that in the Act, which provides that, subject to the provisions of the special Act, every water company should be required to provide a constant supply of pure and wholesome water on the request of four-fifths of the owners or occupiers. Then he says that is practically inoperative, because the four-fifths will not do it, but that it might be desirable to afford the necessary power for this purpose to some independent board. Then he says, "There can be no doubt of the advantages of a constant supply, any more than of the difficulties in carrying it out. These have, in some cases, been found to be insuperable, but the experiment is now being tried in Glasgow on a large scale, as well as in other places, and hitherto with success; but, with or without, there ought, in my opinion, to be a suitable covered cistern or receptacle for the water, to contain a 48 hours supply, in case of accident to a main from frost, or otherwise, in every house which depends upon a water company for its daily supply." Then there is one more official letter from Mr. Booth, and the thing winds up with the report of Captain Tyler, of which I will read the last two or three passages. At the top of page 10 he says, "I find that two new filter-beds are being constructed by the company, one of them affording an area of 75,000 feet, which will be in operation in a few days; and another of about the same size, which it is expected will be completed in about six weeks. The contractors have been working day and night, and on Sundays, to hasten their completion, and I see every reason to be satisfied that there will be no further cause for complaints as regards the quality of the water, as soon as they can be employed. In the meantime the inhabitants have no doubt had good reason to be dissatisfied, and particularly when the river Thames has been flooded, as I have already fully explained in my report of the 16th of December, 1863. I find that the complainants were not at the time furnished with a copy of that report, and I would venture to suggest that a copy of it should now be forwarded to them. I need only add here that the company are doing that which appears to be necessary to remedy the grievance which is now complained of." That is dated the 9th of April, 1864; has there been any further demand made upon you by the Board of Trade since that?

Witness: There has not.

The CHAIRMAN: What would be the cost of a tank or cistern for each house as recommended in this report? "In my opinion there ought to be a supply to every house in the district on every day, including Sundays, and there ought to be a tank or cistern in every house, to contain at least a 48 hours supply."

Witness: I think about 40s. would do the whole, including the ball-cock and the waste-pipe. It would be merely the supplying of the cistern for that sum, and the ball-cock and the pipe from it. It is assumed that there would be a place to put it on.

Mr. DENISON: And it assumes some work in doing it?

Witness: That would be in addition to the cost of the cistern.

The CHAIRMAN: Do you mean that a communication-pipe would have to be added, if there be no communication-pipe at present?

Witness answered in the affirmative. If there was no stand for the cistern it would have to be added. The cost of the communication-pipe would possibly be £1 or £1 10s. It would depend upon the distance from the main to the cistern. The probable cost of setting up the cistern might be £2, £3, £4, or £5. It is a matter of great uncertainty where the cistern could be placed.

Cross-examined by Mr. CRIPPS: A very small portion of our district has already been supplied by the constant system of supply. An experiment was made as to 16 houses in St. George's, and that is the only instance. That was five or six years ago, and it was an experiment which I made myself on my own property. The second year after the pipes had been properly laid on they began to fail. The taps were all being destroyed or taken off the pipes, and it became such a nuisance, not only to the tenants, but to the adjoining property, that I was obliged to take the pipes away.

Mr. CRIPPS: Then your opinion upon the general question would be in favour of the intermittent, and against the constant supply system. Is that so?

Witness: Yes, where proper cisterns are provided I think that it is very excellent.

Mr. CRIPPS: But supposing that a proper system of supervision were introduced, what would be your opinion then? should you prefer the constant supply system as against the intermittent system?

Witness: I should not in a general way; it might be very good for poor districts, where a pipe could be taken at once into the house. Under any circumstances, whatever the machinery might be, my opinion is in favour of the intermittent system. I published my opinion upon the subject five or six years ago. My opinion is influenced more particularly as to the cost of change.

Mr. CRIPPS: Assume that the question of cost of change and fittings and machinery were out of the question, and that everything were to be done and that you had a new system to begin upon, would you still prefer the intermittent system to the constant system?

Witness: I think that the intermittent system has its advantages.

Mr. CRIPPS: That is not quite an answer to my question. Assuming the cost of the change to be out of the question, and assuming there to be proper fittings, would you still prefer the intermittent system to the constant system?

Witness: I think that the intermittent system is certainly to be preferred, and I should prefer it under any circumstances. In the plan which I have furnished the water would be kept constantly on with that system. It is merely a small cistern as an auxiliary, and the company would give the additional water, reducing the charge if any one would provide the cistern to take it. If our mains were constantly supplied, the proposed tank would be always full, but being underground very little pressure would be required, and the stop-cocks would be regulated so as to allow a sufficient quantity of water to pass to keep it constantly filled. I mean that it would be, so far as it goes, a constant supply, and that, I think, would be an advantage to cottage property. I consider it an advantage that poor tenements should be supplied with water. I assume that there will still, with the proposed change, be a cistern.

Mr. CRIPPS: So that, whatever pressure there is upon the main, if the cistern was full, no more water could enter?

Witness: The pipes at the present moment are so badly laid and so weak, and the whole of the fittings are so bad, that they would not sustain any greater pressure than is now put upon them. They are defective and too weak to bear any greater pressure. The change would be from the present defective fittings to a perfect system, and that is what I would take in as an element of the cost. Assuming that we had at present ball-cocks in operation, the great expense would be in regard to this, that the whole of the lead pipeage would have to be renewed between the ball-cock and the company's main—I mean that the whole of the lead pipe is so weak that it would not stand the pressure.

Mr. CRIPPS: How, then, does it happen when you are giving an intermittent supply, when the cistern is full and the ball-cock up?

Witness: Because the water is really turned on for a given time, and there are so many draughts from the main that the pressure is just enough to fill the cistern, and no more.

Mr. CRIPPS: But the pressure at that time upon those pipes is just the same, if not greater, than it would be with the constant pressure, is it not?

Witness: If there were constant pressure it would be due to the head, whatever height the reservoir might be.

Mr. CRIPPS: But with the intermittent system, you must put on pressure to carry the water to the house at present, must you not?

Witness: That would be equal to the level of the pavement, 15 or 20 feet.

Mr. CRIPPS: Then you do not mean that it is merely a question of what height the constant supply must be?

Witness: The constant supply must be high enough to supply the water to the highest house in an undulating district, and that would throw the pressure upon the main of perhaps 150 feet. The whole of the district being on undulating ground, the variation of the pressure from the low part to the higher would be, perhaps, the difference between 50 feet and 100 feet. The pressure is put on to a number of small mains or service-pipes in connexion with the company's main, sufficiently long to charge the cisterns at the height at which they are placed; then as soon as they are filled the cock is turned off, and there is an end of the pressure.

Mr. CRIPPS: I want to get the difference between the effect upon those lead pipes of a constant pressure and of an intermittent pressure. Is it not the case that while the intermittent pressure is on, the effect upon those pipes will be the same as it would be only for a longer time if the constant pressure was on?

Witness: Certainly not; if the waste is prevented under the constant supply system, the water will be penned back to the height due to the head that it comes from, and that may be 150 feet above the level of the street; whereas now the water is turned on, and the height is never more than 20 or 30 feet above the level of the street.

Mr. CRIPPS: Then what you object to is the great height that you would have to send it by the constant pressure system?

Witness: No, that is not so.

The CHAIRMAN: The water in the pipes would be subject to the pressure of the head of water in the service of the company?

Witness: Yes, which might be 200 feet, and that water would be brought to bear upon the communication-pipe, whereas under the present system that water is not brought to bear upon the communication-pipe, but a less head of 25 or 30 feet.

By Mr. CRIPPS: Under the present system that is not brought to bear upon the communication-pipe. It is only due to the height of the delivery to the cisterns. As to supervision, the system would have to be extended if the constant supply system were adopted, because we have now only the power of making the inspection between nine in the morning and four in the afternoon, and a great quantity would be wasted in the night. I have no experience of the supervision under a constant supply system, but I imagine that that would be the case. There are very few houses in our district which are not supplied with water. There are some, I have no doubt, in the outlying districts, which are provided with wells and rain water tanks, and the inhabitants rely upon them. The whole of our water is taken from the Thames above Teddington, and that has been the case since the works were formed there in 1855. We have never had any special complaints made from the General Purposes Committee of the St. Olave's Board of Works. We had an application once for a constant supply by some of the parish authorities, but when they understood that it would cost something to alter the fittings in the district they at once gave up the idea. This was merely an application from the board. They fancied then that constant supply meant constant waste—that is to say, that they had nothing to do but to leave the main open, and let the water run from one year's end to the other. They did not want to spend anything for fittings, but merely for the company to leave the water on, and let it run constantly. We objected that the fittings were not in a state to maintain that. They have applied to us with reference to courts and places, and represented that the supply was insufficient; but when a report has been sent in of the state of the fittings, they have not taken any action in it. It was a question then of one pipe supplying three or four houses. We may have had half a dozen such representations. The state of the fittings was found to be bad in every instance where representations were made, and that was the cause of the deficiency. Then a representation was made to the landlords or to the owners of property, that they ought to put their pipes in a proper state of repair, and have proper cisterns, and in some cases it was done, but in other cases it was not. In some cases the complaints could not be cured. I think the landlords ought to be compelled to put all those matters in proper order.

The CHAIRMAN: Do you concur in the views of Mr. Simpson as to the general character of the valley of the Thames, and the quantity of water that it is capable of supplying through the Thames at Hampton?

Witness: I do.

The CHAIRMAN: Do you also concur in his views as to the possibility of constructing reservoirs for the storeage of water, if necessary?

Witness: If necessary, I do. I think there is every facility for so doing.

The CHAIRMAN: Have you had your attention called to the great difference in the quantity supplied per house to the houses in the districts supplied by the two companies with which you are connected?

Witness: I have.

The CHAIRMAN: Did you observe that in one case 9,317,000 gallons daily are supplied to 26,900 houses and 242,600 inhabitants; and that in the other case it is only 12¼ million gallons to 73,900 houses, and 468,000 inhabitants?

Witness: The principal reason is that in the Grand Junction district the houses are of a very high class, and they have every convenience for consuming water, such as large boilers at the back of their kitchen-ranges, several water-closets, and in many houses two, three, and four baths; they have also in that district a vast amount of road watering, two large railway stations, and so on.

The CHAIRMAN: You would have to correct the daily supply, first, by the special supplies, which are not house supplies; but after that correction there is still a very much larger amount of house supply in one district than in the other, is there not?

Witness: I think it reduces the 39 gallons per head to 26½ gallons. That is in the higher districts of the Grand Junction Company. In the Southwark district the poor people waste a good deal of water, but they certainly do not use so much for the purposes of baths and boilers, and things of that kind, which makes a great difference in the consumption. After making the requisite deductions, the amount per head supplied in Southwark or Vauxhall is just over 20 gallons. The higher quantity is 27 gallons, and after deducting the usual supplies it brings it down to about 20 gallons as nearly as possible. A vast quantity of that is wasted, instead of being used. I attribute the waste to the defective fittings and the facilities of passing the water through the waste-pipes into the drains for flushing. In the Southwark and Vauxhall districts the number of houses below £20 a year, I think, is something like 40,000, and in a vast number of them the fittings are in a very defective state. The great deficiency is in the cisternage; they have, perhaps, a small barrel, or pail, or even a pan, and sometimes they have no cisternage whatever. This is chiefly applicable to the small houses—houses of two, three, or four rooms, letting at probably from 3s. to 5s. a week—but the six and eight-roomed houses are better off; they have either a good-sized water-butt, or a cistern of some kind over the closet.

The CHAIRMAN: What do you propose to have done in order to insure in the small houses a sufficient supply of water?

Witness: I should prefer to see a proper cistern over the closet, or in some convenient spot where it could be placed. If the landlords were compelled to put up cisterns, there would be an end to all complaints.

The CHAIRMAN: But do you see insuperable difficulties to there being a mere pipe and tap introduced into the house, with a constant supply?

Witness: I think there would be the greatest difficulty; the flushings of the closets and things of that kind now are managed from a cistern, and I do not know how that is to be accomplished unless I have some means of storing a given quantity of water. I have seen the small ferrule which has been introduced into the mains in the East-end of London for regulating the constant supply. As far as it goes it is very good; it prevents waste, and accomplishes a certain object—that is, that the water is constantly on, but the quantity is limited; they can only have a certain quantity delivered in the 24 hours, whereas, with the intermittent supply, if they required double or treble the quantity they could have it. It requires the introduction of a cistern. The difficulty in using that system in the Southwark district would be in keeping the water on without the district into various levels, and that in that district would involve an expense of something like £300,000 or £400,000. There are no mechanical means by which we could separate the service so as to have it under different mains, without laying down separate mains, or putting up a high or low level reservoir. The expense would be not so much the cost of the reservoir as of the district mains.

The CHAIRMAN: But if you introduced intermediate reservoirs, it would answer the purpose without any new mains, would it not?

Witness: No; it would involve an alteration of the whole of our system of supply. At the present time the variation of the levels in the Southwark district is from 2 to 3 feet to 160 feet above Trinity high-water mark.

The CHAIRMAN: But would it be necessary to make any greater distinction than 50 feet, for example, from level to level, to avoid all that description of pipe of which you have spoken?

Witness: I think that it would be necessary, perhaps, not to go beyond 25 or 30 feet.

The CHAIRMAN: Do you think that you could easily find a contour line of 25 feet through your district, and adapt pipes to it?

Witness: It could be done, but it would be a very expensive operation. It could not be done without laying new pipes. The water now is brought from one fixed point—namely, Battersea—and it all passes into the district, and the various mains are all under that pressure; and shutting off certain sections of the district from hour to hour in the course of the day enables the water, after the low districts are supplied, to be passed forward into the upper districts; but if the low districts are left then there would not be any water at all, and, in fact, the low districts would not receive any water at any time. That arrangement might be adopted provided that we could connect the existing mains with the intermediate reservoirs, but it would be impossible to find sites for the reservoirs.

The CHAIRMAN: The cost of the six regulating reservoirs, it would now seem, would not amount to the number of hundreds of thousands of pounds you mentioned, would it?

Witness: It is not so much the construction of the reservoirs, but the mains would have to be laid from them or to them.

The CHAIRMAN: The question is whether the mains are so laid that they could be connected with each reservoir?

Witness: They could not without a vast expense; it would be impossible.

By Mr. KEKEWICH: Some of the cisterns in the poorer houses are of slate, others are wooden cases lined with zinc, and many of them merely the commonest class of butt or tub, butter-tubs, and all sorts of things. The deal cases lined with zinc last a considerable time, but not so long as the slate or stone cisterns. Slate is a much more expensive article. A cistern ought to contain about 120 gallons—that is for one house. That would be 20 gallons a day for six people on an average. The cisterns for the poorer houses generally contain from 80 to 150 gallons, but they vary in size. I think a cistern with a ball-cock and a waste-pipe, independently of the communication-pipe and the stand, could be supplied for 40s.

Mr. BENYON: You stated that the expense of changing from the intermittent to the constant system was as great as Mr. Simpson mentioned, but that the expense was due mainly to the present defective state of the pipes, which would not do for the constant supply?

Witness: Yes.

Mr. BENYON: But the present state of those pipes is sufficiently good for the intermittent supply, though not for the constant supply. Is that your meaning?

Witness: That is so.

Mr. BENYON: That is to say that you mean that it would be defective as regards constant supply, but that it is not defective as regards intermittent supply.

Witness: Yes.

Mr. BENYON: And the two and a half millions of money would be incurred in rendering that effective for constant supply which is not ineffective for intermittent supply?

Witness: Quite so. It would be making the change from one system to the other. That is to say there is no considerable expense necessary to render it effective for intermittent supply, but a very great expense would be necessary to render it effective for constant supply.

Lord F. CAVENDISH: I understood you to say, in answer to the honourable chairman, that in every house there ought to be a proper cistern over the closet. Is that so?

Witness: In any convenient place. I think it would be a very good thing for every house to have two cisterns, if it could be so arranged. I think that of importance.

By the CHAIRMAN: I have not considered the plan of having a regulating chamber over the water-closet, so as to prevent any waste of water. An investigation has been made in some cases between the difference in the quality of the water as supplied by the companies, and the quality of the water as drawn from the cisterns in the poorer parts of the metropolis, but I do not know the result.

The CHAIRMAN: Do you know how far the complaints arise from the quality of the water drawn from the cistern differing a good deal from that which is supplied by the company?

Witness: I think that whenever there is a complaint as to quality it arises in that way, because the Registrar-General's monthly returns show that the water as drawn from the mains direct is generally very good, but that where it is taken from a foul cistern it is not so good. The inhabitants, generally speaking, are very neglectful in keeping their cisterns clean.

The CHAIRMAN: Then would it be one advantage of any system of constant supply that it would obviate that source of impurity?

Witness: There is no doubt that if they could draw the water direct, it must be an advantage so far.

The CHAIRMAN: Would it be necessary to give any very large supply if the water were drawn direct for consumption?

Witness: The water so drawn would be of a very limited character in most houses; perhaps only two or three gallons a day, or something of that kind.

The CHAIRMAN: Then would there be any great chance of waste if there were a very limited direct supply for the purposes of consumption?

Witness: It depends upon where the outlet of the tap was placed; if it was over a sink, it might be left to run from morning to night. There is no control on that at present. If the tap is so placed as to allow the water to run to waste, it will be let run to waste in many instances.

Lord F. CAVENDISH: Have you considered the possibility of measuring the quantity of water supplied to a house?

Witness: It is attended with great difficulty. I do not know any meter that would act. A meter might be put on to check it, but whether it would act or not I cannot say.

The CHAIRMAN: On reflection, what do you think would be about the cost of an intermediate regulating reservoir or cistern between your services or pipes? Do you think that it would cost £5000?

Witness: The reservoir itself might not cost very much, but it is the contour mains which would be required.

The CHAIRMAN: The regulating reservoir would be comparatively a small expense, would it not?

Witness: I do not know how it is to be applied; the trunk mains of the company pass direct from their works at Battersea through the lower portions of that district.

The CHAIRMAN: You know that where you have to deal with varying levels with an aqueduct, the ordinary practice is to introduce a regulating chamber, which is a very small affair, though the aqueduct may be a very large one?

Witness: Yes; but in a system of water supply such as we have south of the Thames the whole of the water is conducted to the lower part of the district, and thence by some 400 or 500 miles of distributing-pipes, all radiating, as it were, from the bottom of a basin to the rim, and to divide that it would be necessary to cut off the lower part—to cut off the pipes for every contour of 25 feet. It would be a great expense to take up all the different mains above that level. We should have to connect the mains.

The CHAIRMAN: Are they not capable of connexion and disconnexion by the thousands of turncocks that shut off the different pipes?

Witness: That is the principle upon which they work now, beginning at the lower level and working up gradually to the higher level.

The CHAIRMAN: Then if you have a system by which you can bring all the pipes into action at the contour it would seem that you could bring all the pipes to act, and so regulate that system?

Witness: I think that it would be impossible.

The CHAIRMAN: But it is the fact that you do supply now upon every contour of 25 feet?

Witness: But shutting off the supply in the lower parts; but during that time the pressure is going on to the third, fourth, and fifth. We have the power of delivering the water now at different levels over the whole of the system by shutting off the lower part. We can shut off the pipes at each different level now.

The CHAIRMAN: Then if you can do it daily whenever you require it, you can do it permanently by not opening them.

Witness: Then the waste from the lower part would be so great that it would be an impossibility to get the water to the upper part.

The CHAIRMAN: Probably if you found an Act of Parliament ordering you to supply that, your ingenuity would be able to surmount the difficulties?

Witness: I think that it would be attended with enormous expense to do anything of that kind, because the vast number of pipes on the lower level must be shut up before the water will rise to the upper level.

The CHAIRMAN: But if you have already the power of shutting off and isolating every level of 25 feet at the present time, where is the difficulty of applying to the system which already exists a regulating system?

Witness: It is exactly in this way—the main passes from the lower level of the district to the upper level, and the branch mains radiate from that main at all sorts of levels, and if the lower part were not shut off, there would be no water to pass into the upper part; and to take up this portion [describing it] it would be necessary to bring a main to join that, so that at every 25 feet it would be necessary to have a proper system of mains to join

on to that, and that would entail an expenditure of between £300,000 and £400,000. The whole capital of the company is £1,340,000.

Colonel HOGG: How much would be the cost of altering the fittings of the houses for the constant supply?

Witness: It would cost, for the whole of London, £3,000,000. I agree with Mr. Simpson there, and think he is rather within the mark than not.

The CHAIRMAN: According to your estimate, it would be cheaper for you to alter your system than for all the houses to alter their pipes.

Witness: I think that the expenditure by all the companies would be about equal to the cost of the alterations in the houses.

The CHAIRMAN: There are 73,000 houses in your district, and, at £10 per house, that would be nearly £600,000, would it not?

Witness: That would be, at £8 per house, £584,000.

The CHAIRMAN: And you think it would require an expense of £400,000 to alter your works?

Witness: Yes.

Mr. *Wm. Boughton Hack*, examined by Mr. BURKE.

I am the engineer to the West Middlesex Water Company, and have filled that office for several years. Before 1852, our company took their water from Barnes; and in that year we came under the obligation, the same as the other companies, to remove our works above Teddington Lock. Previous to the removal of 1852 we had taken very great care, at our works at Barnes, to provide pure water for the inhabitants of London. The water was as pure as it could be without filtration. We did not filter then. We have complied with all the obligations of the Act of 1852, and constructed filters and covered reservoirs; and we took the supply above the town of Hampton. The total cost which the company has incurred in complying with those provisions of the Act has been nearly £300,000. We now filter the water, and send it through covered mains and pipes to our distribution reservoirs. We have one covered reservoir at Camden Hill, Kensington, which is 112 feet above Trinity high-water mark. We are authorized to draw from the Thames 20 million gallons per day of 24 hours. Our greatest draught has been under 10 million gallons; the average has been a little over 8 million gallons. That draught has been adequate for the supply of our district. We supply upwards of 30 gallons per head per day to the inhabitants. Our supply is an intermittent one. We have had no complaints on the subject as yet. Our district is occupied by gentry and middle-class people rather than by people of an inferior class. Much the larger ratio would be the better class of houses, which are all adequately supplied with proper cisterns and fittings. We have very good reason to believe that the inhabitants are satisfied with the supply which we give them. We have no requisitions for substituting a constant for an intermittent supply. I think the expense of adapting the present fittings to a constant supply might be £7 or £8 per house on an average. The total amount in our district, on a rough estimate, would be between £200,000 and £300,000.

Mr. BURKE: Do you think that a compulsory outlay of that amount would be viewed with favour by your consumers in order to get a constant supply?

Witness: I do not think that they would ever ask for such a thing. I am sure they would not be willing to incur that expense in order to get a constant supply. If we gave a constant supply it would necessitate, on our part, a much more constant supervision. We should want a complete staff of officers always on the alert, which would, of course, impose an additional expenditure on the company. I do not think that constant surveillance over, and intrusion into, the houses of our consumers would be viewed with favour by them. They do not like our coming in now. They say that we dirty the house, and we must take our boots off. They talk in that way; and sometimes they make you put slippers on before you go upstairs to the upper cisterns. We have experimentally tried giving a constant supply in two cases: one on low ground at Hammersmith, the other on higher ground, about 80 feet above. In comparison with the intermittent supply, we consumed nearly fourteen times as much water on the low levels at Hammersmith, and nearly six times as much at the higher levels. Of course the pressure being less the waste was less. The supply by the intermittent system being sufficient, the excess must have been principally waste, with the present arrangement of pipes. I do not think all the five London companies could supply our district at that rate. I have made attempts to get at the average flow of water where we take in our supply at Hampton, but I find it is a very difficult thing. I see no difference in Teddington Lock now to what it was 40 years ago. In the driest weather I should think there would be something very like 600 million gallons passing our works in the 24 hours. In my judgment there is a very sufficient quantity of water in the Thames to supply London for many years to come with water. We are in a condition to supply double the population which we now supply if you take the maximum, and I believe this would apply to all the other companies taking water from the Thames. When I speak of 600 million gallons per day, that would be probably after the companies had taken their supply. That quantity would be passing over the Moulsey Weir, and past our works. Like the other companies we pay £1000 a year towards the purification of the Thames; we have, therefore, endeavoured not only to comply with every provision of the Act of 1852 at a cost of £300,000, but we have also come under a further obligation of £1000 a year to give a better supply to the public.

Examined by Mr. CRIPPS: When I say that no application has been made to us, I mean that nothing has been done under section 15 of the Act of Parliament. Our district comprises, for the most part, pretty good houses, and the cisterns generally are of a sufficient size. In good houses there are proper and efficient cisterns.

Mr. CRIPPS: Supposing the cistern to be sufficiently large, and that to be filled, practically the parties in that house have, in one sense, constant supply, because their cistern is always filled.

Witness: Quite so. In the poorer class of houses there is no room for cisterns; they have butts in most places. In our district all are pretty well supplied, even in the poorer class of houses. No doubt the constant supply would be much more wanted in the smaller class of houses where cisterns do not exist. My estimate of the alteration is something like that of Mr. Simpson—from £7 to £8. That which constitutes the expense is that we should have to take everything away except the cisterns, because the present pipes would never stand the constant pressure. We should have to start from the main in the street. It would cost that amount to entirely refit the house with new pipes, caps, and everything else. A great many of the cisterns in the houses supplied by us have open pipes, and not ball-cocks. Of course, all ought to have them if they complied with the company's regulations.

Mr. CRIPPS: Have you had any experience at all of the fouling of water in cisterns?

Witness: I had one instance of it some little time ago, when the waste-pipe had connexion with the cistern, and the cover kept it in. That is the only case I ever knew of.

Mr. CRIPPS: But must it not be a danger always with a cistern, if it is not properly attended to, that the water is likely to become foul?

Witness: Not unless the waste-pipe from the closet communicates in some way with the under-side of the cistern. There is, no doubt, a sediment after some time at the bottom of the cistern. In our reservoir it is so, and it will be, however pure the water may be. Persons ought to take care to to have their cisterns cleaned out from time to time, but I do not say that they do so.

Mr. CRIPPS: And if they do not the water will become more or less impure, will it not?

Witness: I do not know that that is really the fact, because the water itself is so free from sediment.

Mr. CRIPPS: But you told me that, however pure it might be, there would be some sediment in your cisterns.

Witness: There may be a little. A great many of the cisterns have no covering at all. There may be a little blacks and soot fall into them from the house chimneys, but there is a Smoke Act, you know, to stop all the blacks. The blacks are carbon, and that might do the water good, you know; but I am not a chemist, and I cannot suggest whether it is a good thing or not. Dust would not be a good thing to put in a cistern. In the cases where we tried the constant system, no notice was given to the parties beforehand that we were about to try it. If it were going to be carried out all over London, of course notice would be given. When we made the experiment we put on a meter, and through the reading of the meter we found what was going on.

By the CHAIRMAN: The turncock went round the district to see how the thing was going on, and he found the fittings in a most dreadful state. He had made an inspection previously, and the ball-cock and everything was put in order, and when he went round again after the constant supply was given, the balls were wrenched off the levers in many cases, and were floating about on the top of the water in the butts and tubs in the low part of the districts, and the lever which was left on the plug of the cock was made a wrench or spanner to turn the plug of the cock always open, and it was found in that state. In Hammersmith, I think, we carried on the experiment for eight days, and in the other case it was found so bad that we stopped after two days. In neither case did we give any notice to the parties before the experiment was made. I have understood that supervision takes place more or less wherever constant supply has been adopted, but I know very little about it.

The CHAIRMAN: But I suppose you know enough about constant supply to know that it has been adopted in a great number of towns?

Witness: I have heard the evidence given here during the last few days. Whatever constant supervision may be necessary must be exercised, and has, of course, been exercised in those places.

The CHAIRMAN: So far as your company are concerned, assuming that the fittings were made properly, would there be any great difficulty in altering your supply from an intermittent to a constant supply with regard to your delivery?

Witness: I think that there would be, unless the pipes are very much reduced in size.

The CHAIRMAN: I asked you the question because I have a report from your company: "The company's works have been constructed to afford a practicable and efficient supply of water throughout their district on the intermittent system, and that they can also be adapted to the constant system."

Witness: Yes, quite so, because we have service reservoirs if it cannot be done by pumping.

The CHAIRMAN: The company are not required by the Metropolis Water Act, 1852, to initiate the constant supply, and they have had no requisition and have not done so.

Witness: Quite so.

The CHAIRMAN: But if that requisition had been made to you, your works are so constructed that you could have supplied on the constant system?

Witness: Just so, provided the house fittings were in order.

The CHAIRMAN: It is entirely a question of the fittings.

Witness: Yes, and some extension of mains. There are houses which had lately been built in South Kensington, and the upper part of the Bayswater Road, which the lower reservoir would not reach so as to keep a constant supply on, and the consequence would be that you must bring a main down to supply those pipes especially. There has been a good deal of building going on in our district. The whole or the greater part of it is filled up. In the northern district there has not been a great deal going on; they do not get on so rapidly.

The CHAIRMAN: In the new houses, or putting in the fittings for the first time, would there be any greater expense than if the constant supply had been adopted, in putting in fittings adapted to the constant supply than to the intermittent supply?

Witness: No, about the same, I think. The pipes would have to be smaller. The weight would be the same, because the pipes would be thicker.

The CHAIRMAN: Have you any houses in your district which you know of which are not supplied at all with water?

Witness: They may have been supplied and the supply taken off. Parties may have moved, and the houses may be empty.

The CHAIRMAN: I do not allude to where the water has been cut off, but in a general way, are all your houses supplied?

Witness: There may be about 3000 houses in our district which are not supplied at all, but we should be very happy to supply them if they asked us. It is a suburban district, and they have wells, or they purchase water from the Hampstead works.

Re-examined by Mr. BURKE: In those districts the parties have wells and tanks collecting the water, and are unwilling to pay a water-rate, and prefer relying on their own supply.

Mr. BURKE: As regards the fittings for new houses, the new houses form a very small proportion of the number of houses in your district, do they not?

Witness: A very small proportion.

Mr. BURKE: The expense of the £300,000 would fall upon existing houses?

Witness: Quite so, taking the whole area.

Mr. BURKE: You did not give notice of this test of the constant supply system. Did you consider that it was the fittest mode not to let any party know what you were going to do?

Witness: I think that that was the proper way to do it.

Mr. BURKE: And with the existing fittings you find that this increase, to the extent of thirteen times, existed?

Witness: Yes.

Mr. BURKE: Did that fortify you in your view that you could not furnish that supply without a total alteration of the fittings?

Witness: You must have a total alteration.

Mr. BURKE: And suppose those fittings get out of order hereafter, what power would the company have to compel their being reinstated in a good condition, so as to prevent waste? Supposing the constant supply were given, which you say with bad fittings would involve a waste to the extent of thirteen times the existing supply, would the company have any power to compel the parties always to keep their fittings in perfect order?

Witness: I think not.

Mr. BURKE: If they had, must they not have a constant power of inspection, in order to be sure that that was the case?

Witness: They would require a constant inspection; it would be an everlasting thing, over and over again.

Mr. BURKE: In the better districts they have cisterns, so as to afford practically a constant supply. In those cases they would not be better than under any other system of distribution.

Witness: They used our present system as a constant system. In our poor districts, which are comparatively few, I have seen cisterns, but they generally have butts standing in the area. They might, of course, have large cisterns if the landlords chose to put them. The cost of a cistern would fall exclusively upon the landlord. By the use of that cistern he would get, practically, a constant supply.

The CHAIRMAN: With reference to the answer you gave, that when your inspector examined the houses he found all the cisterns and appliances in good order, it would seem in that case that the landlord had done what might be expected of him.

Witness: In the first instance; but, after it had been on the constant system, notices were sent in to the landlords to put everything in order again.

The CHAIRMAN: But when you inspected it a second time, it was not the landlords who had destroyed all the fittings, but the tenants, I suppose?

Witness: The tenants.

The CHAIRMAN: Will you be good enough to tell the committee what ought to be done to meet that state of things consistently with a constant supply, supposing that were made compulsory?

Witness: In the low neighbourhoods I do not see any plan that can be adopted, but something like Mr. Greave's plan, that they shall not have the water to waste, but that it shall pass through a small orifice, so that the water in a constant supply shall be just enough to supply the poor houses.

The CHAIRMAN: And you think that that is the best system with which you are acquainted for giving a constant supply with an intermediate cistern?

Witness: I think so. There would be a good deal of difficulty in our district, because it is a rising one. On a uniform level, on a range of not more than 100 feet, it might be very well managed, but I doubt whether it could be done in the West Middlesex district, where there is a considerable range from nothing up to 160 or 170 feet.

The CHAIRMAN: That would involve diminishing the area of the section of the measuring-pipe in proportion to the increase of the head of water, would it not?

Witness: Yes, and to the size of the houses. It would be a difficult thing to arrive at, but it might be done.

The CHAIRMAN: But having arrived at the head of water as delivered at the particular house, and the size of the house, and the number of inhabitants, there would be no difficulty, would there, in determining the size of the measuring-pipe?

Witness: No, or it might be regulated by a stop-cock kept under lock and key, so that in a house which now probably has four or five tenants, and afterwards had ten or twelve tenants, by merely moving the cock, which would be locked up and under the charge of the company, you might increase the size of the orifice and the supply of water.

The CHAIRMAN: That would be the same result obtained by a different mode, would it not?

Witness: Quite so. To carry out the constant system in our district, the pipes must be very much reduced. We always recommend now for six-roomed houses, not less than a ¾-inch pipe, with a view of getting the service done quickly in the course of an hour. Now to give a constant supply, and only to use the same pipe, would be impracticable, and we consider the pipe ought to be reduced to one twenty-fourth part of that.

The CHAIRMAN: Have you applied your mind to the consideration of constant supply without an intermittent cistern.

Witness: I have not. I think that if that were carried out, and there were no waste-pipes, that would be the most reasonable way to do it, because the pipes required would be so very small, and the taps would be small.

The CHAIRMAN: Have you visited any of the places where there is that direct constant supply carried on at present?

Witness: I have not, therefore I am not able to give any opinion from experience upon the subject one way or the other.

The CHAIRMAN: Can you explain to the committee how it happens that your company delivers only 8,200,000 gallons on an average daily to 26,000 houses, whilst the Chelsea Company, delivers 8,000,000 gallons to 26,000 houses?

Witness: I can only account for it on the supposition that there may be more waste in the Chelsea than in the West Middlesex district. If the West Middlesex tenants required more water we should pump more. That may be done to increase waste in the one company over the other. Our company has done a great deal in avoiding waste. We have no complaint of want of water, and therefore I think that the quantity which we supply appears to be quite enough.

The CHAIRMAN: Then you ascribe the difference to the better arrangements to avoid waste?

Witness: Yes, and the proper supervision.

Mr. JOHNSON said that he appeared for the Kent Water Company, and wished to state that the company had not associated itself with the other companies, by reason of its deriving its water from totally different sources, and that at the close of the case of the associated companies he should be prepared to go into the case for the Kent Company.

Mr. TOULMIN SMITH applied for certain alterations to be made in a paper issued by the committee to the parties of points requiring explanation.

The CHAIRMAN said that the alterations should be made.

After some dicussion, the further procedure with the inquiry was adjourned until after the hearing of the East London Bill.

(*To be continued.*)

HOUSE OF COMMONS.

METROPOLIS GAS ACT AMENDMENT BILL, 1867.

FOURTH DAY—TUESDAY, MAY 28.

(*Continued from page* 467.)

Mr. *J. R. Williamson*, examined by Mr. DENISON.

I am a mining engineer, residing in Edinburgh, and have been so for 17 years. I have been employed by a good many noblemen and others who have cannel coal on their estates. One of the characteristics of the Scotch cannel coal-fields is their great irregularity.

Mr. DENISON: Can you tell us how far you can generally reckon on any seam extending before you come to a break in it?

Mr. O'MALLEY objected to the evidence, as the committee had already decided that that subject was not to be pursued.

The CHAIRMAN inquired whether the learned counsel proposed to go into the general case, to show the probability of an exhaustion of coal or cannel, and a consequent rise in price.

Mr. DENISON said he expected to show the probability of a great rise in the price of cannel. It was an essential part of his case, and if his learned friend felt taken by surprise he had better call fresh evidence.

The CHAIRMAN: It is not our intention to enter upon a separate and independent inquiry about the exhaustion of cannel and coal.

Mr. DENISON: You are asked to reduce our price arbitrarily; one among other reasons why we resist is this—we believe that the price of our material will increase, and is increasing now, as the last witness admitted.

Mr. WEBSTER: Quite the contrary, because the table shows the actual price in three preceding years.

Mr. DENISON: If we are precluded from that inquiry, we cannot prove a part of our case. Last year we were stopped from proving our case by the observations of the chairman, which, apparently, did not mean what we thought they meant. All we can do, if that occurs again this year, is to go somewhere else and say so.

Mr. O'MALLEY said the learned counsel never remonstrated when the committee stopped the inquiry.

Mr. DENISON observed that he was not stopped, but his learned friend Mr. Michael, who appeared for one company only, and he did not know his instructions.

Mr. MICHAEL said he understood the examination to be stopped simply on the question with regard to the probable duration of the supply of cannel, not with regard to the point as to how it would be influenced by a much greater quantity being demanded from the existing coal-fields; and he was prepared to prove that, within the last few months, the price had increased as much as 3s. 6d. per ton. That was the most important part of his case—the importance of carefully watching any variations in the supply of cannel coal.

The CHAIRMAN: The committee adhere to the opinion which they have already expressed and acted on, that they will not enter upon a speculative inquiry with regard to the probable exhaustion or the future price of coal or cannel. Facts with regard to the actual variation in price, such as Mr. Michael referred to, we shall be ready to admit.

Mr. DENISON: I think I can confine the evidence within those limits. I was asking the witness how far any seam of cannel coal extends generally without a fault.

Witness: They never extend uninterruptedly for more than two miles.

The CHAIRMAN: We think that evidence is not admissible.

Mr. DENISON: In four out of the eight properties for which you act, is the cannel coal already exhausted?

Witness: That is only in one particular district, but I have a great many more districts.

The CHAIRMAN: I can see no relevancy at all in those questions, except as pointing to that inquiry into which we do not propose to go. We are willing to hear any evidence with regard to the variations which have taken place in price.

Examination resumed: The price of cannel coal has increased in the last few years. The finest gas coal, the Torbanehill, has increased in 17 years from about 17s. 6d. to 50s. It stood for a long time, till about two years ago, at from 30s. to 35s., and since that time has risen to 50s. The reason of that increase is the exhaustion of the fields. In 1862 and 1863, the contract price for Lesmahago was about 17s. 6d. at the pit; the price is now about 25s. In November last, the gas coal masters of Scotland made an arrangement to rise 12½ per cent. in their prices, and from 12½ to 25 per cent. The Edinburgh gas companies raised their price last year 6d. per 1000 feet. That was before the November meeting, when they agreed to raise the price of cannel. The cannel in Flintshire has also risen in about the same proportion, so far as I know.

Cross-examined by Mr. O'MALLEY: The Torbanehill coal has been much used for gas in London. I do not know the names of the companies to whom that coal has been supplied, but I know it has been sent to London. I cannot undertake to say the name of any gas company anywhere to whom it is supplied for gas making. It is used principally for the purpose of distilling into oil. The price of it has taken it very much out of the market for gas making; and taking it out of the gas-works has thrown the demand on other finer gas coals.

Re-examined by Mr. DENISON: The Torbanehill is the same as the Boghead coal.

By the COMMITTEE: The distillation for oil is not a recent process—it has been going on since 1850.

Mr. *Jas. M'Kelvey*, examined by Mr. RICHARDS.

I am a coal agent, residing in Edinburgh. My agency is chiefly confined to cannel coal. I have had 25 years experience as a coal agent. For some years I have been dealing in about 80,000 tons per annum. I know a good deal about the cannel coal-fields of Scotland. The price has risen very much within the last three years, and I believe it is still on the rise. There is an average rise in the best description of cannel, such as the Lesmahago, for the manufacture of gas, of 7s. 6d. per ton; that is the best cannel, with the exception of Boghead, for the manufacture of gas. I supply some of the London gas companies with Lesmahago coal, and other coal of a similar character. I have supplied the Western Company, but they have not had any from me, with a very small exception, for some time, in consequence of the great increase in price. There is an average rise in the second-class cannel of about 5s. per ton. The price of the Lesmahago coal at the pit's mouth I cannot exactly say now, but the price free on board now is 32s. 6d. per ton; and to that must be added for the London companies the freight, canal dues, and so on. The second-class quality of cannel, which is largely used in London, I think would be from 23s. to 25s. per ton, free on board, with freight to be added. There is a rise of about 2s. 6d. a ton on the third-class cannel, but there is not a great quantity of that sent to the London market. In short, there is a rise on all Scotch cannels. I understand that the

Scotch companies have raised their prices in consequence of the rise in the price of cannel in general.

Mr. RICHARDS: Can you form any opinion of the ground of the rise in price?

Mr. O'MALLEY: That is going beyond the limits.

Witness: It was in consequence of the scarcity, I suppose.

Examination resumed: That is my opinion, as a coal agent, and I think I am right. When the Boghead or Torbanehill coal was at 35s., 40s., and 42s., I sent it largely to the London markets; but it is now 50s., and the freight is 8s. at the present time. It would be delivered in London at about 61s. a ton. Since that rise in price the demand has fallen off, and the companies have fallen back on Lesmahago and the second quality of cannel. I cannot state the quantities correctly, but I have sent largely to the gas companies in London during the last ten years.

Cross-examined by Mr. O'MALLEY: I have supplied the Chartered, Equitable, Western, London, and City Companies. I have supplied about 150,000 tons to the Chartered Company within, perhaps, three years, and to the Equitable, perhaps, from 3000 to 4000 tons a year for the same period. I might have supplied 1000 tons a year to the Western Company, but I could not exactly say. I am only guessing. To the London and City of London Companies I sent a small quantity.

Mr. O'MALLEY: Then the "largely" within the last three years comes to somewhere about 160,000 tons for the whole of the companies. Now, when did the first material increase of price take place? What was the price three years ago?

Witness: The price of the Lesmahago coal was 22s., or within a few pence of that, about three years ago. The Lesmahago field is very large, and there is a very large quantity of coal produced; in the other fields the quantities are not so largely produced. The material rise from 22s. in the Lesmahago coal took place within the last six or nine months. There has been a rise of, perhaps, 5s. a ton within that time. Since that time I have supplied a little to the Western, and a considerable quantity to the Chartered—from 5000 to 7000 tons, perhaps. I think I made sales to the Chartered Company at a rise of 4s. about the month of December or January, perhaps, but I am not positive. I will undertake to say that within the last nine months I have sold to the Chartered Company, and perhaps one or two other companies, cannel coal of the best quality at a rise of from 4s. to 5s. a ton. I am supplying the Equitable Company regularly. I distinctly say I have supplied them within the last seven months at a rise of 4s. without discount.

Mr. O'MALLEY: I have a particular reason for asking you whether you have done so within the last six months, because when the time is so short your memory will be fresh.

Witness: I cannot say exactly, but I say that I have had either a contract or contracts at a rise of 4s. per ton. The contracts are in writing. They were for Lesmahago coal, and coal of that quality. I cannot say positively when the rise in the price of gas took place in Edinburgh. I think it has been within twelve months.

Re-examined by Mr. RICHARDS: My contract with the Chartered Company was for a certain length of time—for a year, or three or four years. I base my prices on what I believe would be remunerative, looking forward. House coal has also risen in price.

Mr. *J. B. Paddon*, examined by Mr. DENISON.

I am a civil engineer, and manager of the Brighton and Hove General Gas Company. I have otherwise had a great deal of experience in the construction and management of gas-works. The Brighton and Hove Company had a bill in Parliament in 1866. There was also a rival bill of a new company. That bill was one, among other reasons, which induced the old company to reduce their price. About two years previous the price was 5s., and then there came a series of reductions, from 5s. to 4s. 9d., 4s. 6d., 4s. 3d., and 4s. It was at 4s. when the bill was before the committee. I think I may say those reductions were voluntary; they were not in consequence of any legislative measure. We had then reached 10 per cent. Last year we became liable to a reduction to 3s. 6d. That reduction came into action last June.

Mr. DENISON: Has the reduction in price made more than an ordinary increase in your gas supply?

Witness: No; the increase of business has been less since the reduction than for any previous time—for a long time before, at all events. The majority of the people who wanted gas had got pretty well supplied.

Mr. DENISON: Does the increase go on at an increasing ratio naturally?

Witness: Yes.

Mr. DENISON: Having obtained that fact, I will ask you what has been the effect of the fall in price of 6d. upon your last half year's dividend?

Witness: The effect has been to reduce it from 10 per cent. earned to about 3¼ per cent. earned.

Mr. DENISON: It may be that that is due to something else; but is there any other cause that has been operating?

Witness: Yes; there has been an advance in the price of coal. Taking it per 1000 feet of gas, the net cost of coals has advanced from 13·92d. in 1865 to 17·14d. in 1866. The price of residual products has decreased in the same period.

Mr. DENISON: Advance in the price of coal, decrease of the return in the residual products, and decrease in the price of gas. Are those the three things that have produced a decrease in the dividend?

Witness: Yes.

Cross-examined by Mr. O'MALLEY: It was in consequence of our having to accept the bill of the rival company that our price was reduced. We were forced to accept it for two or three reasons. First of all, the committee decided to pass the Aldrington Bill, and to establish a competing company in the face of two companies already in competition; next, we had really exhausted our capital powers, and we had a growing demand for gas, and there was no way of meeting that except by getting a bill with further capital powers. Our district would have been carved up between the two companies, and the property of the shareholders would have been completely annihilated; therefore we had no alternative but to accept that bill, hard as it was.

Mr. O'MALLEY: Your increased capital was granted for the specific purpose of making a station to supply a particular district, into which you had illegally protruded yourselves?

Witness: Only a very small portion of it; in fact, that extension had been already made.

The CHAIRMAN: You cannot try the cause of a bill of last year over again.

Witness: The new capital was not required for that purpose.

Cross-examination continued: We reduced our price to 3s. 6d. at the end of June, 1866. That was before we were compelled to do it by Act of Parliament. It was a matter of policy to do so. It was considered desirable to do so for several reasons. To a certain extent it was to avoid competition; but there were other reasons, which I am not at liberty to state here, under the policy of my directors. It is not relevant to this inquiry.

Mr. O'MALLEY: Do you mean to say that you did come down to 3s. 6d. before your Act of Parliament was passed?

Witness: I will explain. I forget the exact date when the Act passed. I believe it had passed the third reading, but had not received the Royal Assent. Still there was a clause in the Act whereby we were empowered to maintain the price of 4s. until the end of December; so that practically we reduced the price six months before we were compelled.

Mr. O'MALLEY: But when was it that you voluntarily reduced your price before that?

The CHAIRMAN: The witness says that it was in June, but that they were not compelled to do it until December.

Mr. O'MALLEY: But before your Act of Parliament passed, to what sum had you reduced the price of your gas?

Witness: It was at 4s.

Mr. O'MALLEY: What was the amount of your capital at the time you reduced the price to 4s., because your figures are very extraordinary?

Witness: The share capital was £100,000, and £15,000 borrowed capital. We were paying interest on the borrowed capital.

Mr. O'MALLEY: Do you mean to tell the committee that the effect of reducing the price from 4s. to 3s. 6d. brought your dividend upon £100,000 from 10 per cent. to 3¼ per cent.?

Witness: I mean that it was precisely what I stated, that it was one of the three causes which reduced our profit, and the chief cause. The next was an advance in the price of coal, and the third was a decrease in the value of the residual products. We declared a dividend of more than 3¼ per cent., but it was done by drawing from other funds. We declared a dividend at the rate of 5 per cent. per annum.

Mr. O'MALLEY: In the course of that year you had a good many extraordinary expenses, had you not?

Witness: No, I think not; I think it was rather the other way; in fact, our working was extremely economical during that half year.

Mr. O'MALLEY: "Repair and maintenance of meters, mains, service-pipes, and other works"—it is at the rate of 3 per cent. on your whole capital in that year, is it not?

Witness: Not quite. If you take the working expenses, leaving out the coals, and compare the half year ending December, 1866, with any previous time—say 1865—you will find that on the whole we worked at a very much less rate, and cheaper.

Mr. O'MALLEY: I find the only thing here said with regard to the dividend is, "Dividend paid to the proprietors, June 30, 1866, 10 per cent. on £100,000 capital."

Witness: That dividend was earned in the half year ending June, 1866.

Mr. O'MALLEY: I beg your pardon; there is an appropriation for the last year of 5 per cent. per annum.

Witness: Yes; of which 3¼ per cent. was earned.

Mr. O'MALLEY: Then, in the account which you give, you have only had an opportunity of testing it for about half a year.

Witness: That is all, so far as the accounts are concerned.

Cross-examination continued: There is an increase in the consumption of 8 per cent., compared with 10 per cent. previously. The reduction in price to 4s. was very likely made at the time they were agitating in Brighton for a new company; but I should like to know the time when they were not agitating for a new company.

The CHAIRMAN: No doubt, in the prospect of competition, they might take certain measures; but that does not help us the least in the world. What I understand you to want to show is the effect of certain reductions on the dividends of the company; the object of the reductions does not signify.

Mr. O'MALLEY: I had another object in view, but I did not wish to state what it was just at the moment; however, the question is answered now. (To witness:) The charge for repair is 3 per cent. on the capital—is that the usual outlay?

Witness: Perhaps, if I make this explanation, it will save many questions. The printed account appears for the first time in the form prescribed under our late Act of Parliament, and it was done at the instance of the corporation. It was conceded at that time as an immaterial thing, not worth seeking to alter; at all events, it was very small in comparison with other things between the corporation and the company. It is not a form of account of which I approve, and I am not at all responsible for this; the totals here are correct, but the subdivisions——

The CHAIRMAN: Is there any object in pursuing in detail the analysis of the accounts of this company? I cannot see the object.

Re-examined by Mr. DENISON: I think the repairs, &c., were unusually great last year; but the wages are exceptionally low. We never made such a return before, but, put the two things together, and the average has fallen off.

The CHAIRMAN: But is the reduction in your dividend due to those three causes which the learned counsel asked you about before, or is it partly due to some excessive working expenses charged to the revenue in that half year?

Witness: It was entirely due to those three causes which I have named, and not due to any excessive expenditure charged on the amount of the revenue in that half year.

Mr. *Alfred Wood*, examined by Mr. MICHAEL.

I am engineer to the Hastings and St. Leonards Gas Company. I was assistant manager for 27 years, and for the last 10 years I have been general manager and engineer. We charge 4s. per 1000 cubic feet. The quality is 14 candles.

Mr. MICHAEL: I will refer you to the evidence given by Dr. Letheby, on the 27th of April, 1866. He says—"At the present time, at Hastings, they are under every possible difficulty with regard to the manufacture of gas. They have no harbour there, and they are obliged to pay enormously for coal to be landed on their beach. I do not believe they get coal under 15s. or 16s. per ton. In the next place, they have no means of getting rid of coke. Therefore they are obliged to produce as large a quantity of gas as they can from a ton of coal; and they are getting 9500 feet per ton, and they are selling the gas at Hastings for 3s. per 1000." That was an error of Dr. Letheby, was it not?

Witness: The fact of our charging 3s. per 1000 was an error. We were charging 5s. per 1000 up to April, 1865; after that period 4s.

Mr. MICHAEL: What has been the effect upon your dividend of that reduction?

Witness: We have been able to pay only per cent., whereas previously to April, 1865, we were paying 10 per cent. I believe that we paid 10 per cent. on the next half year, because the first quarter of that year was the productive quarter; but since July, 1865, we have only been able to pay 7 per cent. We have gradually increased our supply, and yet reduced our dividend. There have been no exceptional expenses to cover that diminution

of dividend. For labour and so on we work closer than ever. We have been obliged to drive everything as close as possible.

Mr. MICHAEL: Have you made any calculation as to what you could supply 20-candle gas for?

Witness: I did make a calculation a short time ago, presuming that I could get the Wigan coal at 26s. per ton at Hastings (which I do not think I could), and I found I could not manufacture that gas under 4s. per 1000 feet; consequently, I should have wanted 5s. 6d. or 5s. 7d. to have supplied it to the consumers to give me a 10 per cent. dividend. I have prepared an estimate of the cost of manufacturing gas at the present time. Our make of gas last year was nearly 82 million feet. Our leakage upon that was 12¾ per cent. We sell 71 million cubic feet. In my estimate with regard to the cost of manufacture I take the leakage into consideration, and my figures are those which it costs me at the consumers meters. The cost for coal was 19s. 4d. per ton. It is principally Newcastle coal, with a small per centage of cannel, which it is necessary to use; we cannot make 14-candle gas from Newcastle coal alone. We deduct for products 12·46d. That works out per 1000 cubic feet to 28·72d. We make about 9300 feet, on an average, from a ton of coals—from the mixture.

Mr. MICHAEL: Would it be possible to get 15,000 feet with the same illuminating power?

Witness: Oh! dear, no!

Mr. MICHAEL: Not 10,000 feet?

Witness: Not 10,000 feet. I could get it at a very low illuminating power.

Mr. MICHAEL: By raising the heat very considerably, I suppose?

Witness: Yes. I could get a larger quantity with a less illuminating power; or, reducing the heat, you would get a much smaller quantity, and a higher illuminating power.

Examination continued: The net cost of the coal, after deducting the price for residual products, is 16·26d. The cost for distribution and management is 18·15d., making the cost at the consumer's meter 34·41d.

By the CHAIRMAN: We cannot begin to make any profit until we have received 34·41d.

Examination resumed: We require 18·15d. to pay a dividend on our capital, 2·60d. for interest on borrowed money, and nearly 2 per cent. for depreciation. That makes a total of 57·15d. Our receipts are 52·51d.

Mr. MICHAEL: Then you have a deficiency of 4½d. less your 10 per cent.?

Witness: About that.

Cross-examined by Mr. O'MALLEY: I adopt Dr. Letheby's apparatus for testing the illuminating power—the same as he has in his own laboratory. It is not the same as the London apparatus of 1862; it is a new burner, called Dr. Letheby's burner. I use from a small per centage of cannel up to 20 per cent., according to necessity. I always keep my gas at 14 candles, and if it goes down the slightest I keep putting in cannel until it gets up. The per centage of cannel is from 7 to 8 per cent. on the average, but I could not bind myself to that figure.

Mr. O'MALLEY: Can you only get 9300 cubic feet from a ton of coal?

Witness: Not from Newcastle coal. You may get 9500, but it varies according to the heat.

Mr. O'MALLEY: You can get 9500, with the best illuminating power?

Witness: Not of 14 candles.

Mr. O'MALLEY: You can get 9500 feet of the very highest illuminating power that is capable of being obtained from a ton of Newcastle coal—do you know that?

Witness: No.

Mr. O'MALLEY: Have you ever tested for that purpose?

Witness: Yes.

Cross-examination continued: Our mixture costs us 19s. 4d. per ton; but our Newcastle coals at this time cost us, I should think, about 19s. Hastings is not a good port for the importation of coals. We get our coals in at Whitstable, which is 47 miles from Hastings, and we send them from Whitstable by rail.

The CHAIRMAN: That does not signify. All that it signifies to us is what the cost is.

Cross-examination resumed: We have a town duty on coal of 2s. 4d.; it is included in the 19s. We supply St. Leonards as well as Hastings. I should say that the population of the two towns was 30,000.

FIFTH DAY—FRIDAY, MAY 31.

William Innes, Esq., examined by Mr. DENISON.

I have been the engineer of the Phœnix Gas Company for the last 20 years. That company was founded in 1817. It was incorporated as the South London Gas Company in 1820, and in the year 1824 the proprietary of the South London Company were all transferred to the Phœnix. We have three manufacturing stations—viz., at Greenwich, Bankside, and Vauxhall; and we have two gasholder stations, one in the Blackfriars Road, and the other in Kennington Lane. We supply no cannel gas. Our present capital expended is £888,620; of that capital the sum of £204,620 has been spent since the year 1864. In that year we came to Parliament for extended powers, and to increase our capital; and we have raised and expended this sum since that date. Between 1860 and 1864 we expended £63,000, making altogether, since 1860, an expenditure of £267,620. The capital we were authorized to raise in 1864 was £360,000, and that capital was limited to a dividend of 7½ per cent. In the year 1866 our revenue from gas-rental and the sale of residual products amounted to £218,822. The accounts have been deposited with the Secretary of State, but they are not published, I believe, yet.

By the CHAIRMAN: Those were our gross receipts arising from gas-rental and products.

By Mr. DENISON: We had a small balance of interest to our credit amounting to £479 2s. 10d., and there were some miscellaneous receipts, £659 14s. 6d. The working expenses of the company for that year were £150,363, leaving us a net profit of £68,458. All this will appear in the accounts furnished to the Secretary of State when published, and which accounts are being prepared to be given to the committee under the order of the other day. The Phœnix Company's district comprises a great deal of the suburban parts of London on the south side of the Thames, extending from Charlton, including Blackheath, Lee, Lewisham, Kidbrook, and Southwark, to Clapham Common, Wandsworth Common, and Streatham. They are quite suburban districts. The expenditure of capital for supplying such districts is very much more than it is in the thicker parts of town, and on that account, in the Act of 1860, we were allowed a differential price for gas of 6d. per 1000 cubic feet. It is essential that some difference should be maintained. When the Metropolis Gas Act was passed, we were charging 4s. 6d. per 1000 cubic feet in the town districts, and 5s. in the suburban districts, without meter-rent—that is to say, including the use of meters. On the passing of that Act we made a voluntary reduction over all the districts of 3d. per 1000 cubic feet.

By the CHAIRMAN: That was done in anticipation of the requirements of the public. The Act of 1860 left us power to charge 4s. 6d. and 5s., but we immediately reduced the price voluntarily to 4s. 3d. and 4s. 9d.

By Mr. DENISON: In 1865 we extended our town district and reduced the price to 4s. We also reduced the price in the suburban district from 4s. 9d. to 4s. 3d. per 1000. The result was that the whole of the parish of Lambeth obtained a double advantage, it was made town instead of country, and the price was reduced below what the town price had been. The rental per mile of mains in our town districts of St. Saviour's and St. George's, Southwark, is about £4000 per mile of main, and in Newington and Lambeth about £2500 per mile. In the suburban districts of Lee and Lewisham it is about £800 per mile, and in Clapham and Brixton about £1200 per mile. The profit required to pay our dividend is larger than is the case with some other companies on account of the state of our capital. We require to realize a profit of 1s. 7d. per 1000 cubic feet to pay our authorized maximum dividend of 10 and 7½ per cent. We have £540,000 of capital which is entitled to 10 per cent.; £144,000 to 5 per cent.; and £114,000 to 7½ per cent.; and £90,000 at 5 per cent., making together £888,000. We do not think it is possible to have uniformity without injustice to some one, in so large a district as the Phœnix Company covers. In 1864, we had to purchase land and give a large price for it. We purchased 5½ acres at Vauxhall, for which we paid £68,577, which works out about £11,600 an acre. Some companies have been able to get land at very much less, though some, of course, have had to pay more. Our company was the third established in the metropolis under Act of Parliament, when gas-making was less understood than it now is. We laid a considerable quantity of cast-iron pipe that cost us £15 per ton. The cost now is £6 per ton. From the year 1834 to 1853 we had competition in our district from four companies—viz., the South Metropolitan, the Deptford, the London, and the Surrey Consumers. The South Metropolitan Company was in nearly every part of our district; the London Company over two-thirds; the Deptford Company in a small portion; and the Surrey Consumers over one-fourth. The South Metropolitan and the London Companies came into existence in 1834. They had the advantage of our experience, and probably did things cheaper. There were, during the time of competition, duplicate mains in the streets; there were as many as ten sets of pipes in one street. When the districting arrangements were entered into in 1854, an alteration was made in this matter; we merely kept the three sets of pipes down which were necessary to supply the district—the leading main in the middle, and the two subsidiary ones for service mains. There are no such duplicate mains now existing. During the competition our dividends were reduced to 3 per cent. Previously they had been 6, 6½, 7, and for one portion of the time 8 per cent. They continued at 3 per cent. for two years. On the south side of the Thames the districting commenced in 1854, though it was not sanctioned by Parliament till 1860.

By the CHAIRMAN: We are now paying our authorized dividends of 10 per cent., 7½ per cent., and 5 per cent. For a short time before competition came into our district we were paying 8 per cent., but the competition gradually reduced our dividends to 3 per cent. The absence of competition before the passing of the Act of 1860 increased our profits, and enabled us to pay 9 per cent. Our present dividends over the whole of the capital is not quite 9 per cent. The dividends gradually rose from year to year after the districting arrangements were carried out.

By Mr. LEFEVRE: Our present dividend would average nearly 9 per cent. upon the whole of our capital of £888,000.

By Mr. DENISON: The issue of capital at lower rates than 10 per cent has been all subsequent to 1860. If there were only one company on the south side of the water, I do not believe there would now be any saving in taking up the remaining pipes. The question of leakage is a very difficult one. We take all possible pains to prevent leakage. In the year 1860 there was a long inquiry about the mode of jointing pipes. We have tested it very extensively, and put solid iron joints, metal and metal together, and we have found the lead joints are the most secure. We continue to adopt that system with large-sized pipes. Cast-iron pipes have the least leakage, and we use them for large size mains 2 inches and upwards. We have the best material and the best jointing, and we employ the most experienced workmen. The pipes are all tested by hydraulic pressure. We have so materially reduced the waste of gas from leakage that we think we take the best precaution to make perfectly secure pipes. By the Act of 1860 we are required to keep the gas under an inch pressure in our mains all day. I think that requirement does not apply to any place except the metropolis. It is a serious tax on the companies. There are very few localities where a 5/10ths pressure would not be quite capable of supplying the day consumption, but we are required to give an inch. We have reduced our leakage from 25 per cent. to 12 per cent. The illuminating power required by the Act of 1860 is 12 sperm candles, but we have exceeded that standard. The burners we now use are very similar to those which have been in use for the last ten years. Tested by the burner in use in 1860 we give a higher illuminating power by 2 candles than the Act requires. We give uniformly 14-candle gas, but we are not enabled to do that from Newcastle coal. For ten months in the year we use 5 per cent. of Wigan cannel, and for two months—viz., December and January—10 per cent. The examiners appointed to test our gas under the Act select the burners best adapted for the purpose, and in Lambeth and St. Mary's they selected the burners, and had them fitted themselves. Dr. Letheby also selected a burner, and had it fitted. The apparatus is now entirely under Dr. Letheby's control, and he does precisely as he wishes. If any one has stated that our gas is now a candle and a half less in illuminating power than it was in 1863, it is certainly a mistake. Our reserve-fund is not up to the amount allowed by Act of Parliament. Last year, in consequence of the reduction of price, we had to take from our balance of profits rather more than £3000, to make up the deficiency in the amount required for our dividends. The reserve-fund is set aside half year by half year in specified amounts, and invested in Government securities, the interest paid half yearly being added to it. Our testing-places are about 1000 yards from each of our manufacturing stations. We have had no legal proceedings taken against us for breach of the Act of Parliament. We have had complaints, but none of an important character, and they were all readily met without going to law. There has been no inquiry by the Home Secretary in consequence of any complaints being made to him. Two of the parishes which we supply have appointed examiners. I do not know of any way in which the cost of manufacture can be economized by us. We do not find by experience that a rise in the cost of coal is attended with an increase in the value of residual products. We do not find that the one has much relation to the other. It does not follow that a high-priced coal will yield high-priced products. We are quite sure that nothing under our present price per 1000 cubic feet for 14-candle gas will enable us to keep up our present dividend. One portion of our capital at the time our last Act was passed consisted of £144,000 of capitalized profits, which were the accumulations of 20 years, and upon that we were

authorized to pay 5 per cent. .We have not issued any shares to the public bearing a less rate of dividend than 7½ per cent. I am one of the five engineers who prepared the statement sent to the Board of Trade. The table at page 16 of that return was well considered by us, and I am prepared to stand to it.

Mr. DENISON: You put down, "By sale of 15 bushels Wigan coke, at 5s. per chaldron." Is that as much as you can get for the coke, upon an average?

Witness: That is as much as we can get for it on an average.

Mr. DENISON: If anybody has been able to get more, it must have been from some special circumstances?

Witness: No gas company in London would be able to realize more by the sale of Wigan cannel coke. At all events, we have not done so, and we sell a large quantity. The cost of carbonizing a ton of coals is a matter quite irrespective of the value of the products. If we were required to give 18-candle gas, and at the same time to reduce our price from 4s. to 3s. 6d. per 1000, our profits would be annihilated as a matter of course, and it would take from us the little reserve that we have. We should be compelled to manufacture gas at a loss of 1d. per 1000. An increase in the illuminating power from 13 candles to 18 is an addition of one-third to the illuminating power, and a reduction of price from 4s. to 3s. 6d. is a reduction of one-eighth in price.

Mr. DENISON: Multiplying those two fractions together, and taking the result, it is equal to supplying gas at present at 2s. 7½d.

Witness: It would be 1s. 2d. per 1000 cubic feet—6d. diminution of price.

Mr. DENISON: It is said that if more power is obtained from a different coal, the working expenses will be less. But will it be less? Do you see your way thus to reduce your working expenses?

Witness: We think it would be rather the opposite, for a higher illuminating power.

The CHAIRMAN: You mean working expenses, excluding the cost of the raw material?

Witness: Yes, certainly.

The CHAIRMAN: You mean that to give the same illuminating power from a higher quality of coal or cannel would leave your working expenses, excluding from that item the cost of the raw material, as high, or higher, than before?

Witness: It would.

Mr. DENISON: About the purification. Would the cost of the purification be greater with the higher quality of the gas?

Witness: That would depend materially on the particular character of the coal. Some cannels have a considerable amount of sulphur and other impurity, and some are nearly pure.

Mr. DENISON: Now about the increase in the cost of coals. Is that cost increasing now?

Witness: The cost has very much increased within the last three or four years.

Mr. DENISON: I suppose you mean the cost of both the coal and cannel which you use?

Witness: Yes, both. I can state as a fact that the price of common Newcastle coals has increased 2s. per ton within the last three years.

The CHAIRMAN: I think we may take it that there can be no mystery about the prices of coal in London.

Mr. DENISON: Some of the witnesses seem to think otherwise. The other question is labour, about which I am afraid also there is no mystery.

Witness: Labour has gone up within the last two years from 10 to 15 per cent.—that is to say, ordinary common unskilled labour 10 per cent., and partially skilled labour 10 or 15 per cent.

Cross-examined by Mr. O'MALLEY: The amount of our 10 per cent. capital is £540,000. Our receipts last year for gas and residual products were £218,882, for miscellaneous receipts £659, and for interest £479 2s. 10d. Of the total receipts, £46,654 2s. 8d. is the amount obtained for residual products. The average price of coals was 15s. 9½d. per ton. The cost of cannel during one portion of the year, which was under an old contract, was 23s. 3d. per ton, the remaining portion it was 26s. per ton, without including the expense of delivery. The gross sum paid by us for coal was £81,793 14s. 1d. The working expenses of the year were £150,363, and the net profit £68,458. We have ten directors, whose remuneration is £2000 a year; and a secretary, who receives £1000. The salaries of clerks amount to £1500 a year. I think in the number of our directors, and the amount of our working expenses, we do not differ from other companies. Some companies have fewer directors, and some of the other districts are small compared with ours. We have no mains supplying gas in the districts of other companies, nor do we run across any of their districts. Our Greenwich works are entirely detached from the other two—there is no communication between them. Each company has not a superintending engineer; each of them has a manufacturing manager. In the year 1860 our price for gas in the town district was 4s. 6d., and in the country district 5s. The Act of 1860 left us as we were with respect to price, but we reduced our price in that year to 4s. 3d. and 4s. 9d. Though the Act of 1860 left us as we were as to price, we made very large concessions at that time. Previously we were not under the Gas Clauses Act, but when we came under the Metropolis Gas Act we gave up the powers of our original Act, by which we were unlimited as to the amount of dividend; we were not controlled by the modern clauses, and we gave that up in substitution, as we believed, for the non-competitive trade secured by Parliament.

The CHAIRMAN: I understand you to say that, with regard to any precise diminution of the price of gas per 1000 feet, the Act of 1860 left you alone?

Witness: It did.

The CHAIRMAN: But, in order to get what you considered the advantage of the Act of 1860, you consented to be regulated by the Gas Clauses Act of 1847?

Witness: We did.

Cross-examination continued: The Phœnix Company had not been in Parliament between 1847 and 1860. Every company that came to Parliament after 1847 were, of course, put under the restrictions of the Gas Clauses Act. The effect of the districting has been that our dividends, which in 1853 were only 3 per cent., were last year equal to 9 per cent. upon our whole capital. The arrangements which we made in 1854 were sanctioned by Parliament in 1860, so that the Act of that year carried out our original arrangement, and prevented other persons from making gas for sale in our district.

Mr. O'MALLEY: You say the state of your capital requires a larger sum to pay your dividend than is the case in some other companies. May I ask you what you refer to in that statement?

Witness: In the year 1863 the original capital of the company was absorbed—used for the purpose of manufacture—and we were up to the limits of our power of production. In the year 1864 we came for powers to raise new capital, and of that new capital £204,620 was expended up to Christmas, 1866, but it was not productive in the return of gas-rental because it was not used in the manufacture of gas. It was employed in the purchase of land at Vauxhall, in the construction of works, and in the erection of gasholders. These works have been constructed and will now be used, but they have not hitherto been productive of income. That is one cause of the necessity of increased profits to make up our dividend. Our £540,000 10 per cent. capital was raised gradually from the year 1824, after the purchase, in 1820, of the original proprietary works upon which the Phœnix Company was based. We purchased them from Messrs. Monroe and Evans and the South London Gas Company in 1820, and from the two, with a newly constructed proprietary, the Phœnix Gas Company arose in 1824. We do not consider that a great deal of our old capital is now unproductive to the public. No company could establish similar works on freehold and lay a similar quantity of pipes for that £540,000. We have freehold land which originally cost us £57,000, which, if we now had to buy it would cost us £120,000. We also expended at an early period £145,000 in mains. We have laid out £119,000 in building; the remainder of the capital has been spent in works. When the districting arrangements took place, in 1854, the companies with whom we arranged gave over a certain portion of their mains to us, and we gave over portions to them, and if there was any balance or difference in favour of one company, it was paid in money. We obtained from one company £20,000. Where the mains we thus acquired were available we made use of them; where they were too numerous we took them up, and relaid them in places where extensions were required.

Mr. O'MALLEY: I do not understand this as an answer to the question of what there is peculiar to your capital which requires so much greater an amount of profit.

Witness: I think I explained that tolerably well—the £204,620 has not yet become productive.

The CHAIRMAN: What I understand you to be contending for is this, that having raised £204,620, and having expended it in works which are not yet productive, but which will hereafter become productive, you consider yourself entitled to a profit of 7½ per cent. on that capital in the interval, before it has been employed for the benefit of the public in the manufacture of gas?

Witness: We do.

Cross-examination continued: The South Metropolitan Company go side by side with us in some portions of our district—from the Elephant and Castle along the Walworth Road to Camberwell; but they supply the houses on both sides of the way. Our district lies at the backs of the houses. That company charge 3s. 4d., and we charge 4s. per 1000 for gas, they having arrived at such a position that the lower price pays the interest on their capital.

Mr. O'MALLEY: You spoke of a thing that I could not quite understand. You distinguish between a reserve-fund which is invested under the Act, and of which the interest is brought into the account of the company, and a reserve profit fund. What is that reserve profit fund?

Witness: I do not think that I used that word. I merely said balance of profits varying from time to time. We consider that the reserve-fund is a special arrangement of the Act of 1860, that requires the investment to be made in Government securities, and the interest of those accumulations to be added from half year to half year until they arrive at 10 per cent. on the capital, and then it ceases altogether. That we call the special reserve-fund of the Metropolis Gas Act, 1860. But our balance of profits is merely a floating sum of £10,000, sometimes used as working capital, and sometimes used for the equalization of dividends and not invested.

Cross-examination continued: The Act requires that after our maximum dividend is paid, and the reserve-fund has reached 10 per cent. on the capital employed, the public shall have the benefit of a reduction in price, but the two funds have not come to that yet.

The CHAIRMAN: The point in dispute is whether you have complied in letter and spirit with the provision of the Act of 1860 with regard to the reserve-fund?

Witness: We have.

The CHAIRMAN: Have you not created an intermediate fund which retards the operation of the provisions of that Act?

Witness: We think it does not.

Mr. O'MALLEY: Why do you think so?

Witness: Because the two funds together are not equal to the 10 per cent. indicated by the Act. I think the whole amount invested as our reserve-fund is £9100.

Cross-examination continued: We have not taken any money out of that fund to make up back dividends. We have taken money out of the balance of profit fund for that purpose. That was at Christmas, 1866, and the amount was £3000 odd. Since 1860 we have been paying our maximum parliamentary dividends, and for three years we paid back dividends, but only once was the money for that purpose taken out of the balance profit fund. We paid 4½ per cent., and 1½ per cent. back dividends, for three years, in three separate payments. The 1½ per cent. was upon the original capital of £540,000. We are bound to keep up an inch pressure in our mains all day. All companies under statute are bound to keep their mains full, I apprehend, but I do not think that any, except the metropolitan companies, are required to give more than 5/10ths pressure in the daytime. There is not much profit on the day supply of gas on the south side of London—not so much as on the north. Nothing less than an inch pressure will do for cooking purposes. We employ the same construction of burner for testing the gas now that was used in 1860, with the orifices the same size and the central aperture the same area. The capacity is not larger, and it does not show a higher illuminating power with the same gas.

Mr. O'MALLEY: Do I understand you to say distinctly that the aperture by which the air is admitted to the burner now is the same as the aperture of the burner used after the passing of the Act of 1860?

Witness: The same interior area.

Mr. O'MALLEY: I asked you whether the aperture by which the air is admitted to the burner is still the same?

Witness: Well, I answer that by saying that the area is 5-16ths in diameter, the same now as it was in 1860.

Mr. O'MALLEY: Do you undertake to say it is the same as it was in the burner of 1860?

Witness: Yes; I will put the two burners before you, if you like.

The CHAIRMAN: I feel bound in justice to the witness to say I see no hesitation in his answer.

Witness: No; there could not be.

Mr. O'MALLEY: Your Argand burner is 5-16ths internal aperture, did you say that?

Witness: Yes.

Mr. O'MALLEY: Three-tenths of an inch?

Witness: I did not say so.

Mr. O'MALLEY: That is so, is it not?

Witness: You can make it so, if you like.

Mr. O'MALLEY: Is it not so?

Witness: If you choose.

The CHAIRMAN: Is it the same burner you used in the year 1860?

Witness: Not quite. The top disc through which the orifice is passed is steatite, and not capable of enlargement of the perforation. The orifice of the old burner was made of metal, which, by oxidation, increased in capacity until what passed through was larger through the metal burner than it is now through the steatite burner; it is only that the modern burner is more enduring.

Mr. O'MALLEY: That is the only difference between them, is it?

Witness: That is the only difference.

Mr. O'MALLEY: Would you object to produce the burner such as you test by now?

Witness: Not the smallest objection.

Mr. O'MALLEY: Do you use in testing the same burner as Dr. Letheby tests by?

Witness: At three of the stations.

Mr. O'MALLEY: You have Dr. Letheby's burner at those three stations. Do you mean that Dr. Letheby's burner, by which he tests now, is the same as that by which the gas was tested immediately after the year 1860, with the exception of the steatite?

Witness: They are not the same burners, but they are of the same construction.

Mr. O'MALLEY: The orifice is exactly the same?

Witness: Yes; there is no difference.

Mr. O'MALLEY: They produce the same result from the same gas?

Witness: Precisely; the new burner will give the same number of candles with the same quality gas.

Mr. O'MALLEY: Is Dr. Letheby your tester now?

Witness: He is at the three testing-offices that are placed at 1000 yards from the manufacturing works.

Mr. O'MALLEY: Then is there any difference between your burner now and what it was last year?

Witness: Not any.

Mr. O'MALLEY: When was Dr. Letheby appointed your tester?

Witness: Nearly, but not quite, two years ago. We have had a chemical tester since 1854—Mr. Warrington, of Apothecaries Hall.

Mr. O'MALLEY: I have Dr. Letheby's evidence here——

Mr. DENISON: You have not called him.

Cross-examination continued: For ten months in the year the cannel coal we employ is distributed over the common coal at the rate of 5 per cent., and there is no separation of the coke, but for two months in the year we use 10 per cent. of cannel; it is manufactured in separate retorts, and the coke is kept separate, because the coke of cannel deteriorates all the other coke, and depreciates the price we get for it. Up to a certain limit we think that burning the cannel and coal together gives better results. We have never supplied cannel gas.

Mr. O'MALLEY: With regard to the 18-candle gas that you have spoken of, it is mere conjecture, is it not?

Witness: I think it is not conjecture; we know the price of the coal.

Mr. O'MALLEY: But it is a calculation, at all events.

The CHAIRMAN: The question means this, I suppose—have you any experience personally of the cost of making 18-candle gas?

Witness: I have not.

Cross-examination continued: Practically, what we now supply is 14-candle gas, and the computation which I gave for the 12-candle gas is not a representation of the cost to us at the present time. My experience of the sale of cannel coke amounts to the two months consumption of cannel coal. It is about 700 tons for the two months—perhaps a little more. That coke is chiefly sold for cement. The common coke we sell very largely to coal merchants, the average price for the whole year being about 8s. 6d. or 9s. per chaldron; but it varies very much, depending upon the weather. Sometimes it is as much as 18s., and sometimes as low as 5s. per chaldron within a period of six weeks. We have tested the illuminating power of cannel coal in a small way, but I should not be so well able to give an opinion upon the question as some others; mine would be merely the result of experiment and not of works upon a large scale. The illuminating power of gas from Ince Hall Wigan cannel is about 22 or 24 candles. If a higher illuminating power is obtained the number of cubic feet obtained per ton must be reduced, but with a yield of 10,400 feet per ton the illuminating power is 22 to 24 candles. If the cannel is very specially selected from the middle of the seam you may get 30 to 32 candles. With Newcastle coal 9500 cubic feet per ton may be obtained of 12½-candle gas; some will give more. The Pelaw Main would give 13½ candles, but not 14, if 9500 feet are obtained.

Mr. O'MALLEY: You differ from Dr. Letheby again, for he says 14?

Witness: I never knew that he was a gas-maker.

The CHAIRMAN: What it amounts to is this, that that is the result of the witness's experience, and he differs from everybody whose experience differs from that result.

Cross-examination continued: Practically we get a chaldron of coke from a ton of coals; the highest price we have ever obtained for Wigan cannel coke is 6s. I cannot say whether we get more oil from cannel, because the whole of the liquid products go together, but, practically, we know that the tar and oil from cannel are richer than from common coal. It would, commercially, be worth more; but at our works we are not prepared to separate the products. Our consumption of coal is 103,741 tons per annum, of which the quantity of cannel is 7000 tons. The net cost of gas at the consumer's meter is 29d. per 1000 cubic feet. In order to avoid the risk of penalties we are obliged to send out our gas at a higher illuminating power than is prescribed by the Statute. We should still be obliged to do so if the liability to penalty were determined upon the average of a certain time, because there are sometimes circumstances in the supply of gas in which the atmospheric influence would considerably depreciate it at 1000 yards from the works.

The CHAIRMAN: Would it be a considerable convenience in the conduct of your business if the penalty was taken on an average, instead of on each violation of the rule, so that you might have an opportunity one week of giving a better gas in order to make up for the past week in which the gas was not so good?

Witness: That would be a very great advantage, because anything that would involve us in penalties would put us into constant squabbles. We should concur immediately in an arrangement of that kind, and I think it might be made mutually beneficial as between the public and ourselves.

Mr. O'MALLEY: Your main-pipes, which conduct your gas from the works to the testing-house, are always put at such a depth as to be independent of atmospheric influence, are they not?

Witness: If the testing were limited to the testing-house appointed by the company, or at the public test, I think we should have no objection in any way; but if a vestry, or a special board, choose to select any individual lamp at any distant spot which was deficient from any local circumstance, and made that the point of testing, we should object.

The CHAIRMAN: It amounts to this, does it not, that the form of test to which you would not object would be an inadequate form of test for the protection of the public?

Witness: No, because it is really the best position for testing the whole of the gas manufactured.

The CHAIRMAN: But as I understood you, in order that the test at the principal testing-places may secure to the public that they really shall get that quality of gas at the extreme points, it is necessary to go above the prescribed amount of illuminating power?

Witness: Yes.

The CHAIRMAN: Then to go down to the prescribed amount at the testing-place would result in the extreme points getting an inferior gas?

Witness: Yes.

The CHAIRMAN: Therefore, in order to secure to the public what they actually require is it not necessary to maintain the higher standard?

Witness: No doubt.

Mr. O'MALLEY: At present you are only liable to penalties for deficiency at the testing-place?

Witness: Anywhere in our district.

The CHAIRMAN: What is important for us to learn from the witness is anything that his experience can give. Any argument you can give us in your speech.

Mr. O'MALLEY: We have got this fact, that in conducting your gas from your factory to the testing-house, supposing a fixed testing-place, you are independent of atmospheric influences?

Witness: Yes, we are.

Mr. O'MALLEY: But the penalties are penalties only for falling below the minimum at the testing-house; you do not want to make any allowance for atmospheric influence, do you?

Witness: No, not for atmospheric influence; but it would be extremely difficult for the manufacturing plant of the gas-works to keep up a uniform supply which would secure the company, unless they went 1½ candle above the limited standard. The quality of the coal is so variable in itself; for instance, we have two separate classes of Newcastle coal daily in use.

The CHAIRMAN: Your remarks come to this, that as you manufacture from various qualities of coal, if you do not aim a little higher than the prescribed amount when the coal did not turn out well, you would be, in truth, below that standard?

Witness: Yes, we should; we require an addition to the standard.

Mr. GOLDNEY: You spoke of the price of coke per chaldron. What does a bushel weigh; you give bushels in the account sent in to the Board of Trade?

Witness: It is about a quarter of a cwt.; a sack would weigh 4 bushels.

Mr. LEFEVRE: Have you raised all the capital that you are authorized to raise?

Witness: Not yet.

Re-examined by Mr. DENISON: The cost of delivering our coals upon the works is 1s. 8d. per ton. We are particularly well situated for the purpose. At one of our works a ship can come alongside. If the expense of our directors and secretary was abolished it would make a difference of about 1-23rd of our profit. I think the expenditure, in the metropolis, on directors is about £21,000; I do not know how that works out per 1000 feet of gas. The whole of the consumption of coal is about 1000 millions of tons. But there is one thing to be said about the directors: the directors of this company alone represent £100,000 in the undertaking in their own pockets; you could not get a paid officer of any company to have the same status in society as a man investing £20,000 in a place like that. You get a higher standard in that way than by having any manager, and if I had the works myself, I would pay the money on account. I do not think you could get a manager to do the thing as well for much less than the directors cost. We only began to pay our full rate of dividend in 1860, so that under the Metropolis Gas Act we might have recouped ourselves for back dividends for a considerable time back, but we have only done it for three years. If we had not come under the restrictions of that act, we might have paid up all the dividends that we were deficient of during the time of competition, when we were only receiving 3 and 3½ per cent. All that we have abandoned and also the comparatively unlimited powers we possessed of dealing with our customers to what we now have, all these circumstances were urged whereby the Act of 1860 should be passed. It was a kind of compromise in which concessions were made on both sides. We could not have issued our 7½ per cent. capital on the condition that it should not receive dividend till the capital became productive. If it had been a 10 per cent. deferred dividend it might have been issued at a great sacrifice. Our 7½ per cent. shares are now at 20 per cent. discount. The necessity for keeping an inch pressure on our mains during the day involves a large waste, and the profit on the day supply is very insignificant.

By the CHAIRMAN: We ceased to pay 3 per cent. in 1853. The dividend gradually rose until, in 1860, we reached 9 per cent. We attribute the gradual rise in our dividend to the districting arrangements.

The CHAIRMAN: What was the benefit that you consider you derived from the Act of 1860.

Witness: We believed that by making the concessions that we did we obtained security for a number of years, and the provisions imposed upon us by that Act, though onerous, were quite within our control and capability of performance, and we were willing to concede them for the security obtained.

The CHAIRMAN: The question I put to you is what was the benefit you expected—was it a confirmation of the districting arrangements?

Witness: It was.

The CHAIRMAN: And the exclusion of competition?

Witness: It was.

Examination continued: We attribute the rise in our dividends to the exclusion of competition. It has also enabled us to supply gas two candles better in quality and at a lower price, while we have obtained the maximum dividends upon all our capital.

The CHAIRMAN: What other benefits do you think the Act has conferred upon the public?

Witness: They have the free use of meters without cost; the service-pipes are laid into the houses without cost; a protection is given to poor customers, inasmuch as they have not to pay the debts of their predecessors, and they have the power of compelling us to give them gas if they are situated at any point within 50 yards of a present supply of the company. If a house is built 50 yards from an adjacent main, we have to extend a main-pipe up to that house within eight days, in order to supply them with gas-and every public lamp must be provided for at 75 yards from the last public lamp; so that in all extensions in new districts we have a considerable

capital to lay out, in return for which we get a very small amount of consumption. That includes a considerable capital expenditure.

The CHAIRMAN: Was the arrangement you made in 1853, and which was confirmed by the Act of 1860, on account of all those benefits which you anticipated, and which you describe your company as having derived?

Witness: I think so.

By Mr. LEFEVRE: We have not exhausted our power of raising new capital. We have raised £114,000 by share capital, and £90,000 upon debentures, out of £360,000 we were authorized to raise with the usual borrowing powers. The new shares were issued to the shareholders generally *pro ratâ;* they were not issued to the public, but they have since got into different hands, and are now selling at a discount.

By Mr. WEBSTER: The free use of meters and service-pipes was secured to the public by the Act of 1860. Before then we had the power of charging meter-rent, but we had not done so since 1856.

Mr. *Frederick John Evans*, examined by Mr. RICHARDS.

I am a member of the College of Engineers, and have been engineer to the Chartered Gas Company for the last four years. I have been connected with that company more than 30 years. From my childhood I have been familiar with gas matters. The Chartered are the oldest company in London. They have three manufacturing stations, one in Westminster, one in Brick Lane, and the third in the Curtain Road. We supply cannel and common gas separately. We supply cannel gas to the House of Commons and to a portion of the public through a separate system of mains.

Mr. RICHARDS asked the witness some questions with respect to the capital, which he stated was £810,000 actually expended; the gas-rental, which he stated to be £298,306; the working expenses, and the net profits; but, at the suggestion of the chairman, he stated he would get these particulars from the accountant.

Examination continued: Our price for cannel gas is 5s. 6d., and for common gas 4s. We reduced the latter from 4s. 6d. to 4s. in December, 1865, and at the same time we reduced the price of cannel gas from 6s. to 5s. 6d. The illuminating power of our common gas has been constantly about 14 candles, and of the cannel from 22 to 23 candles, tested at the prescribed distance from the works. As a practical engineer, I believe it is necessary to work at that sort of margin in order to be secure from penalties. In 1859 our dividend was, I believe, 8 per cent. The districting arrangements on the north side of the Thames were made in 1857, and were confirmed by the Act of 1860. I have gone into the question of the cost of the production of gas. With our company the unaccounted-for gas amounts to 18·31 per cent.—*i.e.*, the entire difference between the quantity of gas made and the quantity sold, including all gas burnt upon the works, all gas lost by condensation, leakage, incorrect registration of meters, and stealage. The leakage from the pipes is but a very small amount of the whole. Looking at the quantity of gas sold, the cost is 38d. per 1000 cubic feet.

By the CHAIRMAN: That is the cost of the two descriptions of gas, as we cannot separate the two in our accounts.

By the COMMITTEE: We were at work under competition for many years, but we have never kept any separate accounts for the purpose of showing which kind of gas paid us best. I could give an estimate of the cost of each that would be very near. The principal reason why we supply cannel gas is that the Western Company, which came into our district, supplied that only, and we were obliged to make it in order to compete with them. We fixed the price at 6s. because that was what the Western Company were charging. The price of common gas has been gradually coming down—a few years ago it was 6s.

By Mr. RICHARDS: We began to make cannel gas before 1850. I put the cost of the two together at 38d.; that would give a 16-candle gas. The profit necessary to pay 10 per cent. is about 1s. 4d.—16·14d., making together 54·14d. Our average charge is not quite 4s. 2d. per 1000, = 50d., which leaves a deficit of 4·14d. We do not at present pay 10 per cent. upon our capital by a long way. The dividend for the half year ending in December last was 8¾ per cent., and that was not actually earned profit, as it included a sum of £9200, which we had received for the sale of some Boghead coal, upon which we had a surplus. Our balance of profit and loss would only enable us to pay 7½ per cent. The prices of coal and cannel are rising. We pay every possible attention to the manufacture of gas, so as to produce it at the cheapest possible rate, and to improve its quality. I believe the London companies would try everything brought before them with that object. We cannot earn 10 per cent. and supply gas of 14-candles illuminating power at a less price than 4s. The coke obtained from Wigan cannel is very inferior, and we put the value of it at 5s. a chaldron. We have not used any for several years; we use Lesmahago and Boghead. The market value of the coke produced from those coals is very low indeed; we could sell you any quantity at 2s. a ton. Newcastle coal produces a chaldron of coke per ton; Wigan cannel about 20 bushels, worth about 1s. 2d. per ton. The additional cost to the company to make 18-candle gas in the manner proposed by the bill, instead of 14-candle gas, would be 1s. 2d. per 1000 cubic feet. The result would be, as it requires 1s. 4d. profit to pay our 10 per cent., that we should pay no dividend at all; what with the proposed increase in illuminating power, and the decrease in price, it would be a dead loss to us.

Mr. RICHARDS: With regard to the evidence of Dr. Frankland as to the product from a ton of coal, what is your experience? He told us that a ton of Newcastle coal produced 10,000 cubic feet of 15-candle gas?

Witness: I never heard of such a thing; you could not do it in the laboratory.

Examination continued: We consume about 600 tons of coal a day at our three stations during the winter time, and in our case the whole quantity of gas realized, including the cannel and Boghead coal, does not on the average exceed 9000 feet per ton. I am not aware of any arrangement by which our cost of distribution could be diminished in any way. As far as the Chartered Company are concerned, we have the largest amount of rental per mile of main of any company either in Manchester or elsewhere. Our mains lie in the City of London with those of two other companies, and also in two districts outside the City. The mains are all connected. Some mains pass through a district which we do not supply, and that must necessarily be the case unless the system of districting were rearranged altogether. There is not an immense waste of money, as stated, from the number of mains that lie idle in particular streets. The loss by mere leakage—that is, the gas that escapes—I do not think is 4 per cent. of the quantity made. When we have a superfluous main, we cut it off, and let it remain dead if it will not pay to remove it; if it will, we take it up. I do not know of any main belonging to our company which is charged with gas, and yet performs no duty.

Mr. RICHARDS: Something has been asked with reference to the burners. Let us understand about this burner that has appeared since 1860. You have had as much experience as any one; is there any burner in existence now which was not in existence before 1860?

Witness: No better burner. There are burners now in existence which were not in existence in 1860.

The CHAIRMAN: We do not want you to go into the different sorts of burners. All we want to know is whether, when you speak of gas as 12 or 14 candles, you mean at different times the same thing. (To witness:) Does 14 candles in 1867 mean the same thing as 14 candles in 1860?

Witness: Yes; there is no difference whatever. It is not the fact that the burner as now used gives a difference of 1½ candle. There were inferior burners in 1860 by which we could reduce the illuminating power of the gas.

The CHAIRMAN: I do not understand that there is any contest between the parties as to the second schedule of the bill. As long as it is a question about the quality of the gas we understand what we are about, but if there is to be a controversy upon the second schedule, we must know that we are to direct our attention to that.

Mr. RICHARDS: We do not admit the description of the burner described in that schedule.

The CHAIRMAN: Are you examining this witness for the purpose of showing us that we ought to object to insert the second schedule in the bill, because if not the details of the burners are not much to the purpose.

Mr. RICHARDS: We are accused of making no difference in the quality of the gas, because it is tested through a different burner; we positively deny that.

The CHAIRMAN: That is upon the notes; that is all I suppose you want.

Mr. RICHARDS: You are one of the engineers who signed the memorandum that has been already referred to?

Witness: I am.

Cross-examined by Mr. WEBSTER: The burner in the second schedule of the bill differs in construction and material from the burner in use prior to 1860. I think it is better than that in many respects, but not as regards the giving of a greater illuminating power. It differs in the size of the holes, and the various proportions of the internal chamber, but the burner that existed previous to 1860 will give equally good results. They are different in construction, the top of one being of iron, and the other of steatite, but the result which both will give is the same.

Mr. HOPE SCOTT: When both are new?

Witness: Yes, it is merely a question of wear.

Cross-examination continued: I consider them both the same as regards the testing of illuminating power, and as far as that is concerned I would as soon have the old burner as the one described in the schedule. The difference is merely a matter of mechanical construction. I do not think there is a difference among gas engineers on that point. The one now generally used is called the steatite burner.

Mr. WEBSTER: Are you aware of Dr. Letheby's evidence last year?

The CHAIRMAN: We do not want to take evidence except upon points which are in controversy. If the opponents wish that we should hesitate to insert this schedule, then of course we must go into it, because we must hear both sides in detail upon it; but if it is merely a question whether 14 candles in 1860 and 14 candles in 1867 mean the same thing, then this witness has stated, in the strongest way possible, his opinion that they do.

Mr. MICHAEL: Permit me to say that I am totally against this burner, because it does not apply to 20 candles. I have not said a word, because no evidence has been given by me with respect to the test that should be applied to cannel gas.

The CHAIRMAN: My object is to narrow the inquiry to the points upon which there is any contest, so that we may not waste time. If the counsel on either side do not wish to examine this witness upon the schedule, it is idle for us to go into things that have no relevancy, except as pointing to the schedule.

Mr. MICHAEL: Therefore I have been silent; but I must not be taken as assenting. I find that silence was taken as assent a few days back.

Cross-examination continued: The same burner is not suitable for 20-candle gas as for 12. Our unaccounted-for gas is 18·31 per cent., of which the leakage from pipes is not more than 4 per cent. The difference arises partly from defective meters, partly stealage, for there is a great deal of gas stolen—we have cases continually occurring—and partly from meters not always registering the quantity of gas passing through them, especially since the introduction of dry meters. The total cost of our coals last year, including expense of delivery, was £140,358 7s. 9d. In 1864 it was £125,190. The receipts for residual products in 1866, including coke and everything else, were £49,344 10s. I cannot tell what it was in 1864. The salaries of some of our officers have been increased lately. We have twelve directors, who received last year £2500. I dare say they did receive £2387 in 1864. The total amount paid last year for salaries and commissions of collectors was £12,295 6s. 5d. Very likely in 1864 it was £10,394. There has been an increase in other expenses between 1864 and 1866. There has been a great rise in the price of coals, and we have had to pay more for barging them.

Re-examined by Mr. RICHARDS: I am a shareholder in the company. The value of the shares in 1860 was £62 to £72; in 1866 they were £85 to £81; and this year they are down to £62. I think the rental of the company is less now than it was in 1864. There has been a decrease owing to the reduction in the price of gas.

By the CHAIRMAN: The districting system was applied to our company in 1857. Before that time we had been paying only 6 per cent. dividend for many years. After the districting the dividends began to rise immediately; that system effected a great economy, in paving especially. We have a capital of £810,000, and our annual receipts are £298,000. The common gas rental for the year ending at Christmas, 1866, was £175,280 11s., and the cannel gas rental was £58,182 17s. 5d. The public lighting, which would include cannel and common gas, because many lamps are supplied with cannel gas, exclusive of the cost of lighting the lamps, was £16,992 0s. 5d.; making a total rental for the gas £250,455 9s. 9d., from which £1492 17s. 6d. for bad debts must be deducted.

The CHAIRMAN: What I was pointing to was this:—Do I understand you rightly, with so large a capital, and so large a receipt, dependent partly upon the sale of cannel gas and partly upon the sale of common coal gas, you have no accurate means of telling the directors whether they derive a larger profit from the sale of common coal gas at the price at which they sell it, or from cannel gas at the price they sell it?

Witness: There are no direct means, only by estimate, although the manufacture is separate and the supply is separate. The number of retorts employed with cannel coal is constantly varying, as the quality of the coal varies.

The CHAIRMAN: Has it never been suggested to you by the managers of your company that it would be interesting to them if you, as engineer, could tell them which branch of their business was the most profitable?

Witness: I could only tell that by estimate. As to anything like an accurate statement, I am unable to give it.

SIXTH DAY—MONDAY JUNE 3.

Mr. *Thomas Bush*, examined by Mr. RICHARDS.

I am the accountant to the Chartered Gas Company. I have been in the company's service 30 years. I have here the company's accounts for the last year, as prepared by myself. The total receipts for the year ending December 31, 1866, were £315,053 17s. That includes the sale of the residual products as well as the gas-rental. Our working expenses for the same period were £244,201 14s. 9d., leaving a balance of £70,852 2s. 3d. The quantity of gas made was 1,474,132,000 cubic feet. Dividing the £70,852 2s. 3d. by that quantity gives 11·53d. per 1000 cubic feet as profit. That is on the gas made.

By the CHAIRMAN: The quantity of gas sold was 1,204,228,000 cubic feet. The rate of profit is 14·12d. Our price is 5s. 6d. cannel, and 4s. common. I cannot say how much was sold at each price.

Mr. RICHARDS: Take the cannel first; how much cannel gas was sold?

Witness: I cannot give you the separate quantities; I can give you the amounts.

The CHAIRMAN: If we are to know this, we must know it accurately. You say you sold a certain quality, and at a certain per centage of profit upon it. Now, how much of that was cannel gas sold at 5s. 6d., and how much coal gas sold at 4s. 6d.?

Witness: I have the money value; £175,282 worth of common gas, and £58,152 of cannel gas.

Examination continued: Our total capital now is £810,000, of which sum £150,000 has been subscribed since 1860; that is separate from the present call. We have a bill before Parliament this year. Our latest Act of Parliament was 1823, I believe. We were first brought under the operation of the Gas Clauses Act by the Act of 1860. We were not under it in any way before that. We are entitled to pay 10 per cent. upon our whole capital of £810,000; that is, £81,000 a year. To make up this dividend we should require a profit of 13·19d. per 1000 feet. upon the gas made, but upon the gas sold 16·14d. That is taking the two together, the cannel and the Newcastle. We do not keep a separate account for the two. The same people who manufacture the one manufacture the other, and the same clerks and collectors collect for both. The question of profit varies from time to time, according to the cost of raw material, the extent of rental, and so on. The distribution question comes more under Mr. Evans's province than mine. Our dividend in 1850 was 6 per cent.; in 1851, 4½ per cent.; in 1852, 4 per cent.; in 1853, 4 per cent.; in 1854, 4½ per cent.; in 1855, 6½ per cent.; in 1856, 6½ per cent.; in 1857, 6 per cent. The year 1857-58 was when the arrangement was made among the companies north of the Thames; we were parties to that arrangement. In 1858 the dividend was 7¾ per cent.; in 1859, 8 per cent.; in 1860, 9 per cent.; in 1861, 7⅜ per cent.; in 1862, 10 per cent.; in 1863, 10 per cent. and 1 per cent. back dividend; in 1864, 10 per cent. and 1¾ per cent. back dividend; in 1865, 10 per cent. and 1⅞ per cent. back dividend; in 1866, 8¾ per cent.

Mr. RICHARDS: Now, with regard to 1866, do you confirm the evidence that has already been given, that you only earned 7½ per cent., and that the extra 1½ per cent. was due to the sale of Boghead coal?

Witness: Quite so.

Examination continued: We reduced the price of both gases at Christmas, 1865. We were under no legal obligation to do so. We have not made the reserved fund contemplated by the Act of 1847. We have a contingency fund amounting to about £20,000, which has been accumulating for a vast number of years. It is certainly not a reserved fund under the Act of 1847. The only amount we have carried to that fund lately has been the interest accruing from the same, minus the amount we may have taken from it to pay for coal losses at sea; we have no insurance. We had a floating balance carried over on the 31st of December last of about £70. The sums carried over as floating balances vary, but not to a large amount. We have never created any reserve-fund under the Act of 1847.

Mr. RICHARDS: With regard to the £20,000, supposing you were to treat that as a reserve-fund under the Act of 1847, that would be one-fourth of what you would be entitled to lay by, for you would be entitled to lay by £81,000, would you not?

Witness: Yes.

Cross-examined by Mr. WEBSTER: We buy the coals at our own risk, and do not insure. We find that the cheapest way of carrying on our business. The price we pay is not the price delivered into the yard, because we deliver ourselves into the yard. We buy the coals at the colliery, and charter the ships, taking all the risks. We sold nothing else but the Boghead coal during the year. The Boghead coal had gone up to such a price that it was not profitable to the company to use it for gas-making purposes; we had an offer to take that portion of the contract which we did not want, and we sold it. We had not a large stock; it was a contract in Scotland. We made a large profit upon the transaction. It appears in the accounts under the head "Miscellaneous receipts." We sold nothing else last year, or the year before, to make up the dividend. That sale of Boghead coal was an exceptional transaction. The amount received was something over £9200. In 1866 the directors allowances were just under £2500, and in addition to that there was a testimonial presented to the directors by the proprietors to the amount of £1575, making the total £4071. There had been no increase of allowance to the directors in 1864 or 1865. Very possibly the directors allowances in 1864 were £2387. In 1864 and 1865 they were at the same rate, but the amount might vary; we pay the allowances by the number of attendances. The salaries in 1866 were £8562. The company have a regular scale of increase, which is carried on; we have a periodical increase every year, depending upon length of service up to a certain point. That includes the secretary's salary, which is now £1200. There has been no increase of late in the salary. There might have been an increase last year.

By the COMMITTEE: I have not the dates of increase of salary.

The CHAIRMAN: Has the burthen on your working expenses, diminishing thereby your visible profit, been considerably increased of late by any changes in the payment made to the directors, secretary, or clerks?

Witness: I might say not very materially; there is not any vast increase, except that £1500. The scale of increase of salaries has not been altered for years.

Mr. WEBSTER: Can you account for the increase of salaries between 1864 and 1866—£7250 being the amount in 1864, and £8500 in 1866?

Witness: I could make it up if I were at home, of course.

Mr. PEEL: It would be that the secretary's salary was not included in the £7250, perhaps.

Mr. WEBSTER: It ought to be included.

The CHAIRMAN: If it is intended to show that in consequence of new arrangements there has been a general profuseness in the expenditure, that one understands, but unless it is something of that kind these mere details of the accounts of the company have no interest.

Mr. WEBSTER: We are told that they must have 13d. on the gas made to pay a certain dividend, and that they must have 1s. 4d. on the gas sold to pay the same. Now, we want to get at the distinction between the cost of the materials, the cost of manufacture, and the cost of management.

The CHAIRMAN: I quite understand. The total of their working expenses is either already before us, or a single question would put it before us. But the two things that are of importance are, first, what is that gross charge; and, secondly, whether it is greater than it need be; and in that is included the question whether, in consequence of the arrangement of 1866, there has been any sudden increase, showing profuseness arising from that arrangement.

Cross-examination resumed: In the cost of coals for 1866—£146,358—is included the shipping, delivery, freight—in fact, everything. We have a contract at the collieries, and then ship the coals ourselves. The total sum received from the residual products in the year 1866 was £49,344. The total expenditure for 1866—£244,201—includes every item. I am not aware that in Mr. Hughes's return for 1864 the total expenditure is put down at £307,575.

The CHAIRMAN: Mr. Goldney points out that that £307,575 includes the shareholders profits of £86,000.

Mr. WEBSTER: Yes; you are quite right. I beg your pardon.

Re-examined by Mr. RICHARDS: What was the difference of price in Boghead coal which induced you to sell your contract?

The CHAIRMAN: We have got the fact that it rose very much in price.

Mr. RICHARDS: It appears that in the year 1866 a larger sum is debited to salaries. During that year had the number of your accounts considerably increased?

Witness: No doubt; there is an extension going on every year.

Mr. RICHARDS: Am I right in saying that though the amount of rental is little, if at all, more, the number of the accounts at a lower rate have very much increased?

Witness: Yes.

Re-examination continued: I cannot recollect whether it has been found necessary to have additional clerks in the establishment. The graduated increase of remuneration does not apply to the directors. If they do not attend they do not get paid. The present secretary came about four or five years ago. I think he has had an annual increase of salary until it reached its present amount.

By the COMMITTEE: I have never been desired to ascertain what the relative advantages to the company were of selling cannel or coal gas. We have not raised the total amount of capital we are entitled to raise, by £90,000, under the Act of 1823.

Mr. *George Henderson*, examined by Mr. DENISON.

I am secretary and manager of the Plymouth and Stonehouse Gas Company. The Plymouth Company is one that was put in as a cheap company in Mr. Hughes's table of prices; the price is 2s. 9d.

By the CHAIRMAN: The illuminating power is 13 candles.

Examination resumed: I know the London gas. Our 13-candle gas is not equal to the London gas, I should say. Our company was established in 1844. We were established as a competing company with another company. In 1848 we bought up the old company—the United General.

Mr. DENISON: You appear to have bought that company at rather a low price.

Witness: I think, on the whole, it turned out very advantageous for the company. At the time that the purchase was made it might not have been termed a low price, perhaps.

Mr. DENISON: You gave less for the works than they cost?

Witness: Yes; but we had a plant which we did not require, though it came in very advantageously ultimately. The purchase-money was to be paid in instalments, which we paid entirely out of profits; so that our capital nominally was less than was paid really. In 1856 we obtained further capital. We came to Parliament for it, and were brought under the usual conditions at that time. Our price was fixed at 6s. as the maximum, and our illuminating power at 10 candles. We have gradually reduced our price to 2s. 9d. At present we are paying the maximum dividend of 10 per cent., and have been doing so for some years; but for many years we did not, as we were appropriating profits to liquidate the price of the old company. I have compared our working expenses with those of the London companies that are not supplying cannel gas—eleven companies. With regard to the price of coals, it is about the same as in London. With respect to labour and other materials, we are better off than in London—about 4d. per 1000 in favour of Plymouth. I have got that in detail, if anybody wants it.

By the CHAIRMAN: This 4d. per 1000 is everything except the price of coal.

Examination resumed: Bricklayers wages in Plymouth are 28s. per week; in London they vary from 33s. to 37s.; smiths, 26s., against 33s. to 36s. in London; stokers, 24s. in Plymouth, 27s. 6d. to 34s. in London. "Stokers" is the principal item. The cost of manufacture last year on the gas sold was 2s. 3d. per 1000 feet.

By the CHAIRMAN; On the quantity made it would work out to about 2s. 7½d. The leakage is about 4½d.

Examination resumed: Besides paying off the price of that old company out of profits, we have made large extensions from time to time. Including the amount paid to the old company, it would be about £50,000.

By the COMMITTEE: In 1847 we commenced, I think, or within a year or so.

Examination resumed: Our present capital is £72,000; it would have been near £140,000. £50,000 has been expended out of the profits, besides the paid-up capital of other works; and we had other items.

The CHAIRMAN: They must either come in or be left out.

Witness: Then take it at £50,000.

Mr. DENISON: Then what am I to do with regard to the £140,000?

Witness: It would be £122,000.

Examination resumed: Our present nominal capital requires 8d. per 1000 feet as profit to pay 10 per cent., whereas the average of the London companies require 1s. 4d. per 1000 feet, and most companies throughout England would require a similar amount, I think. Besides that, there is a difference of 4d. in the labour, making an exact difference of 1s. between our condition and the London companies, and our gas is not quite so good. On the £122,000 capital it would require from 1s. 1d. to 1s. 2d. per 1000 feet, against the London 1s. 4d. We carbonized last year 18,725 tons, which would work out to about £4 per ton on the paid-up capital, not including the £50,000. On our real capital it would be £6 10s. The average price of coal last year was 16s. 10d. per ton, including both common and cannel coal. It has risen from 15s. 3d. in three years. The price of cannel has risen from 24s. to 39s. in the same time. If the price of coal goes on rising at this rate, we shall not be able to keep up a revenue which would pay us the dividend of 10 per cent.; we are barely able to do that now. We are under no restriction against raising our price when once lowered. In fact, many years ago we had to increase our price 1s. per 1000, in consequence of coal getting up during the Crimean war. I do not find that the increase in the price of the residual products keeps pace with the increase in he price of coal. On the contrary,

it has diminished, although the price of coal has increased. In 1856 we were getting 9s. 4d. per ton; this year we are only getting 6s. 7½d. per ton. There has been a gradual diminution in the value of the reserve-fund. With regard to the capital per ton, I have examined some other companies. At Brighton, for instance, it would be £7 per ton; Devonport, £7; Exeter, £6 15s.; Hastings, £7 10s.; Leamington, £8; Torquay, about £7; Bath, about £6 10s. I selected those places simply because I had information about them, and not about others.

Mr. DENISON: Can you understand Mr. Stevenson saying that the cost per ton of gas-works might generally be taken at £4 per ton?

Witness: That was Mr. Hughes's statement. It might apply to one company in a hundred, perhaps; but I feel satisfied it is quite inapplicable to the companies generally. Besides, no fixed price could be laid down; the construction of the works would vary considerably. At Plymouth we have limestone and every building material touching our works, and we can make our erections much cheaper than some other places.

Mr. DENISON: Mr. Stevenson told us that the works ought to cost per head from 20s. to 30s.

Witness: I have not gone into any calculation upon that, but I put no faith in any such random statements; it is not based on any fact at all.

Mr. PEEL: £6 10 is the lowest per ton you know practically?

Witness: Yes; it cannot be worked out at a lower sum than that, as a rule.

Mr. DENISON: Taking the actual price of cannel, have you calculated at what price it can be supplied in London?

Witness: At present Lothian cannel, which Mr. Hughes stated would cost 35s., is 39s. 6d. per ton.

Mr. DENISON: With regard to the increase in the quality or power of gas by one or two candles, when you get up to 14 candles, can that be done without a very considerable increase of cost?

Witness: No, it cannot be done; 12 to 14 candles means something like 4d. or 5d. per 1000 cubic feet at least. Take common gas, at 12 candles—if you bring it to 14 candles it involves a cost of about 5d. per 1000 feet, at least; you must use 5 per cent. of cannel to do that.

By the CHAIRMAN: Our average of cannel would be 5 per cent. throughout the year; sometimes a little more, and sometimes a little less.

Examination resumed: That is required to produce with safety 13-candle gas. I have made a calculation for raising the power up to 18 candles, and I find it would increase the cost to about 11d. beyond 14 candles. It would work out to about 2¾d. per candle, as near as possible. I believe that the general rise of the power of gas to about 14 candles is steadily raising the price of cannel. We have found a gradual rise in the price of cannel ever since we commenced using it, which I attribute to a gradual increase in the use of it for gas, besides the use of it for oil and other purposes.

Cross-examined by Mr. RODWELL: I am manager and secretary of the Plymouth and Stonehouse Gas Company.

Mr. RODWELL: You are not a gas engineer?

Witness: I did not say I was.

Mr. RODWELL: You are not a gas engineer, are you, in fact?

Witness: I have told you what I am.

The CHAIRMAN: The witness does not wish to assume that title; he tells you plainly what he is.

Cross-examination resumed: I have never constructed any gas-works. I have other works at Launceston of my own, in connexion with one or two individuals. I have been secretary and manager at Plymouth for 14 years. The figures I give as to the cost of production, and so on, are my own calculation. To produce 18-candle gas would take half a ton of cannel and half a ton of Newcastle coal.

Mr. RODWELL: What prices do you put for them?

Witness: I find that my calculation is for 16 candles only.

Mr. RODWELL: Do you mean that the 11d. is due to the increase from 14 to 16 candles?

Witness: No; it is 5d. from 14 to 16. I have not worked out 18; but say 2 candles.

Mr. RODWELL: How came you to say, just now, that the increase to 18 candles would be 11d.?

Witness: It is the cost per candle. I find that it makes a difference of about 2½d. to 2¾d. per candle. Of that calculation I feel perfectly confident. That increase is from 14 candles upwards. We do not want cannel for 12-candle gas; it is above that we require it. The increase in cost is entirely due to the cannel.

Mr. RODWELL: You say that the relative price of coal at Plymouth and London is also equal.

Witness: Yes; taking it upon the average. There is only a difference of 4d. or so for labour and other little things—increase in repairs, &c.; but the extra cost in London is made up by requiring 1s. 4d. for dividend instead of 8d. The cost of distributing in Plymouth is 1·60d., whereas the cost in London, in some companies—the Chartered, for instance—is 2·3d. ordinary repair, maintenance, and so on. In one company—the City of London—it is 4·81d.

The CHAIRMAN: You have not taken the average cost of distribution, have you?

Witness: No; I take the average cost, including distribution, which works out to 2s. 7d. in London against 2s. 3d. in Plymouth.

Cross-examination resumed: To some extent, the cost of distribution is regulated by the area over which you have to take your pipes; but it does not always follow that the thicker the population, and the more the consumption is concentrated, that the cost of distribution is less. The cost of distribution is about the same at Plymouth as in London, I should say, but I have not gone minutely into that matter. We commenced paying 10 per cent. dividend in 1855, when we were charging 6s. per 1000. We reduced our price to 2s. 9d. in September, 1863.

Mr. RODWELL: You were paying 10 per cent. during the whole of that period. How do you account for the difference in the price that you charged? You have given us 10 per cent. when you were charging 6s.; and then, up to 1863, when you reduced your price to 2s. 9d., you were giving 10 per cent.

Witness: In 1855 we required 1s. per 1000 to pay our dividend, and in 1863 we required only 7d. per 1000. In 1855 the quantity of gas produced was only 80,393,000, whereas in 1863 the quantity produced was 149,982,000; and the capital, I believe, was the same, as near as possible. We had expended in the year 1855, £53,350, and in the year 1865 only £57,500, with more than double the consumption. The cost of gas, or rather the diminution of price, was caused partly by the increase of consumption. The price of coal was lower just previous to 1855 or 1856.

Mr. RODWELL: But in 1856 you ought to have charged less for your gas than 6s., ought you not?

Witness: We were then appropriating large sums to pay off the old company's works. We had no other means.

Mr. RODWELL: Will you look at that letter [handing one to witness]? Is it in your handwriting?

Witness: Yes.

Mr. RODWELL: It is dated July 2, 1864, and is addressed to Messrs. Wright and Co., who are gas people in the Strand. It is to this effect:—"Gentlemen,—I have duly received your favour of the 30th inst., and I enclose report and balance-sheet of this company for the last two years. The quantity of gas manufactured for the year ending March, 1864, was 149,982,000 cubic feet. I am at a loss to understand why gas cannot be rendered in London for the same price as in Plymouth, the cost of coal being somewhat less in London. The reason assigned by the editor of the JOURNAL OF GAS LIGHTING for the low price of gas at Plymouth will apply even more forcibly to the London gas companies." Now, what has happened since 1864 that you have changed your opinions?

Witness: Labour; I was not aware of the expenses of labour at that time. I have only found it out recently. I took it from the average of seven companies. I was not aware that it required so much per 1000 feet to pay the dividend on the capital.

Mr. RODWELL: Dismissing the question of capital out of consideration altogether, and the 10 per cent. dividend, and looking at the abstract question of producing the gas, are you still of opinion that gas might be produced at the same price in London, or not?

Witness: Not at the present rate of wages.

Re-examined by Mr. DENISON: In short, in 1864 I did not know; but in 1867 I do know. One reason why we have been enabled to reduce our price is, that that plant which we bought, and which was at first superfluous, has now become available.

Mr. DENISON: Now, about your 2½d. a candle. Your 2½d. works out very much, does it not, to the same thing as the difference warranted by the Act of 1860, where there is 18d. allowed between 12-candle gas at 4s. 6d. and cannel gas, which is 20 candles, at 6s.?

Witness: Yes, pretty much.

Re-examination continued: I have not been told anything about the cost of repairing in London, after opening the street, as compared with Plymouth, but I presume it is higher in London. The streets in Plymouth are not laid upon concrete as they are in London.

Mr. *John Reid*, examined by Mr. HOPE SCOTT.

I am engineer of the Edinburgh and Leith Gas Company, and have been engaged in the management of gas-works about 25 years; part of the time at Montrose, and seven years at Edinburgh and Leith. Our company is not the only one supplying Edinburgh and Leith; there is also the Edinburgh Company. They both supply the same districts, with cannel gas only. The Edinburgh and Leith Company sold, in the year terminating on the 15th of May, about 200 million cubic feet. The company are not under any parliamentary regulations as to illuminating power. We employ usually about eight or ten different varieties of cannel. It is all Scotch, coming from Lanarkshire, Mid Lothian, and Fife. The quantity of gas from those cannels varies, according to the mixture, from 9500 to 10,500 feet—an average of 10,000 I should say. I am always assuming the same illuminating power—from 25 to 27 candles. All the cannels are liable to a greater variety of illuminating power than common coal. Change in the atmosphere and the temperature in which they are distilled makes a great difference. In winter, giving the same illuminating power, we require a higher class of cannel. Our gas sold to consumers costs the company for coal 22·66d.

By the CHAIRMAN: That is the cost of the cannel on the gas sold per 1000 feet for the year ending May, 1866. I cannot speak to the present year yet.

Examination resumed: I have deducted the gas lost and unaccounted for before giving that price per 1000. Last year our unaccounted-for gas was 15·82 per cent. It is becoming less every year. Some years ago it was considerably higher. The highest is 20 per cent. I do not at all attribute such a per centage to leakage from pipes.

Mr. HOPE SCOTT: But you have been able to reduce the per centage, we hear, from 20 to something like 16; what measures did you adopt which had that effect?

Witness: So far as the per centage has been attributable to leakage, our savings have been in that particular especially. We have renewed a considerable number of our main-pipes, and the leakage has come down in proportion, because our sales have largely increased and we have had less increase in the extension of our mains. We are sending more gas through the same mains. We lose a good deal by the public lamps, I think, through miscalculation of quantity, and excess generally; also by fraudulent abstraction to some extent, and a good deal by irregularity of meters. Condensation, of course, has to do with it very considerably. We are very favourably situated in Edinburgh with regard to the actual leakage, disturbance of our pipes, our mains generally not being laid in very narrow streets, or with a great traffic upon them. Where they are in narrow streets, with a heavy traffic upon them, the tendency to disjointing is much increased. I have not deducted from our cost price whatever we could get out of the Scotch cannel in the way of residual products. That has to come off yet. We do not get near as good coke from Scotch cannel as from Newcastle coals.

Mr. HOPE SCOTT: Nor so much in quantity?

Witness: No; but I am not experienced in the case of Newcastle gas-making coal.

Examination continued: For the present year we shall have consumed about 20,000 tons of Scotch cannel, and after deducting the amount of coke which we use as fuel, and also deducting a very large proportion we have to throw away as utterly useless, we shall realize something like £300 for coke sold. We dispose of our coal tar, and oils, and ammoniacal water—in fact all our liquids—to a company who take it by contract. For the year ending May, 1866, it was 2s. per ton on the coal carbonized. What we receive for residual products would reduce the cost price of gas by 1s. 10d. per 1000 feet. We throw more than one-third of our coke out, as it is useless for fuel altogether. The company to whom we sold the residuals paid us upon about 18,000 tons at 2s. per ton, for the year ending May, 1866. We are now getting rather more; I think 2s. 3d., but I am not sure, as I am speaking merely from memory. If we had a new contract to make now, we could not get 2s. for it, there is such a change.

By the COMMITTEE: I have not said yet what was the average per ton of cannel coal. The price per ton for all varieties, for the year ending 1866, was about 16s. 3d. Taking off 2s. for residual products leaves 14s. 3d. The coke takes £300 more off. A ton of coal produces about half its weight of coke, but I have already mentioned that about one-third of the whole is useless for any purpose whatever. Cannel is dearer for the present year.

Examination resumed: We are obliged to use double the usual quantity of coke in order to carbonize. We are obliged to have two furnaces to each oven, to keep up the heat, on account of the quality of the coke. We have lately been obliged to raise our price, owing to the increasing price of cannel, and the cost of production generally. Both companies in Edinburgh gave notice, in nearly similar terms, on the 9th of October last, I think, that

in consequence of the great rise in the price of parrot coal, and the cost of production generally, the price of gas in the quarter after that which was then ending, until further notice, would be raised to 4s. 10d. per 1000 feet; the discount and meters to remain as at present. Previous to that the price had been 4s. 4d. Previous to announcing the advance in price, we made inquiries of the various companies in Scotland, to ascertain what their views were as to meeting the difficulty of the advancing price in parrot coal—cannel coal—and after some little time we got returns from several companies who had advanced their price for the same reason as ourselves. Aberdeen advanced from 5s. 5d. to 5s. 10d., an increase of 5d.; Arbroath, 5s. to 5s. 10d., an increase of 10d.; Dundee, 4s. 8d. to 5s. 2d., an increase of 6d.; the Edinburgh Gas Company, 4s. 4d. to 4s. 10d., an increase of 6d.; the Edinburgh and Leith Company, 4s. 4d. to 4s. 10d., an increase of 6d.; Hamilton, 5s. to 5s. 10d., an increase of 10d.; Kircaldy, 4s. 5d. to 4s. 10d., an increase of 5d.; Musselburgh, 5s. to 5s 5d., an increase of 5d.; Portobello, 5s. to 5s. 5d., an increase of 5d.; Montrose, 5s. to 5s. 10d., an increase of 10d.; Perth, 4s. 2d. to 5s. 8d., an increase of 1s. 6d.; and there are others, I believe, who have advanced, but from whom I have not had returns in time to make use of them. All these towns, I think, except Aberdeen, are tolerably near to some kind or other of parrot or cannel coal. Hamilton is nearly in the middle of them. Arbroath and Montrose, Aberdeen and Dundee, may be considered out of the coal-fields; all the others are within a convenient distance. We have adopted our alteration in order to keep, in some degree, the same sort of relation in increase as the other towns. I think the companies in Scotland supply cannel gas almost entirely. They are the cannels of the Mid Lothian fields—viz., the New Battle and Arniston; I estimate them as the first class. Then there is the west country coal—the Lesmahago, the Riggside, and the parrot. They are first-class coals. Taking the New Battle as a very fair example of the first-class quality, from my own experience and repeated trials, it would give about from 33 to 34 candles, not more. The Lesmahago, I think, is about equal to that. I could name another, but I am sorry to say it is shut up, and I doubt whether it is likely to yield any coal for some time; that is the Overton. I think it is rather better than either. The reason it is shut up, I understand from the agent, is the difficulty of working the coal. I classify those cannels which give 21-candle power and upwards as the first class; the second, those which yield from 15 to 21 candles; and the third class, those under 15. There are several Scotch cannels under 15 candles. There are a great many second class—Wilsontown, Heywood, and Cleugh, and several varieties in the Mid Lothian district, Grange, near Bo'ness, and several others.

By the COMMITTEE: It is doubtful whether the second-class cannels would be worth bringing to London.

Examination resumed: The price of Arniston in 1864 was 20s., delivered at our works. In 1867 the price was 25s., being an increase of 5s. One variety of Lesmahago—the Wee coal, which I used in 1866—I bought under contract at 18s. 6d. per ton. I applied to our agent, from whom we had some within the last fortnight; he told me that the price would be now 30s., being an increase of 11s. 6d. per ton.

Mr. HOPE SCOTT: Do you know any particular invention as to that Lesmahago Wee coal, with regard to extracting oil from it?

Witness: No; but I do not think that that would affect the price of coal just now, for there is very little of it used at present. The oil trade is in such a state that it is in our favour for purchasing gas coal.

By the COMMITTEE: The price of this particular coal is prohibitory at present, as far as we are concerned.

Mr. HOPE SCOTT: Is it the American oil which has spoiled the English trade in oil extracted from this coal?

Witness: Within the last few years two or three of the coals (I believe some of the Lesmahago coals) were used for distillation to produce oil; but, in consequence of a great many of those oil-works being at a standstill nearly, a larger quantity of these coals are now open to gas companies to purchase. In 1865 we bought 2000 or 3000 tons of New Battle coal for 20s.; for the present year we pay 24s. 6d. Overton, the one I have just referred to, I bought in 1862 at 23s. 4d.; the price quoted to me now, within the last couple of months, is 31s. 6d.—a difference of 8s. 2d. The Wilsontown I bought in 1866 at 15s.; the present price is 22s. 3d. It has gone to that price by two steps. It was during the intermediate period 19s. per ton. There is now a difference of 7s. 3d. Cleugh coal—a coal very much like the previous one—was 15s. in 1865, and it went by two steps to 19s. and up to 22s. 3d., which is the present price offered to us. That is 7s. 3d. increase. Then there is the Heywood, which is nearly of the same character as the Cleugh. In 1866 we bought that at 14s. 8d. a ton, and it went up to 19s., and is now 22s. 3d., being an increase of 7s. 7d. Wemyss is a first-class gas cannel. I bought that in 1861 at 22s., and I have bought none of it since, but it cannot be bought under 27s. 6d., being an increase of 5s. 6d. per ton. Methill is a coal I am using a considerable quantity of. In 1865 it was 13s. 6d.; it is now 18s. 6d., being an increase of 5s. All these prices are for coals delivered on our works. They are all fair gas cannel coals. The lowest per centage of loss is about 22½, and the highest about 62 fully.

Mr. HOPE SCOTT: I believe you have not been remiss in trying to get your coals arranged for this year?

Witness: In the early part of the year I became very anxious about our purchases for the year. We have been for several years in the habit of concluding for our year's supply in the month of April. I applied for this present year in the month of January, and I was not at all surprised to find that some of the coalowners on whom we relied hesitated a good deal about giving us the quantity we required. I have the letters in my pocket.

The CHAIRMAN: Never mind the letters, but let us know what you have done?

Witness: They stated that they could not fairly supply us with the proportions which we used to get, and that from the great demand made upon their outport there was a likelihood of decreasing——

The CHAIRMAN: Never mind the likelihood; we want to know the fact. What are the prices of your contracts?

Witness: We have made for Arniston coal a contract for 25s.; for New Battle, 24s. 6d.; for Wilsontown, 22s. 3d.; and for Methill, 18s. 6d. The average of former years was 16s. 3d. I am not able to say what will be the average of this year, not having yet made up our yearly accounts; but I expect it will be considerably above.

The CHAIRMAN: We do not want a detailed inquiry into the state of the Scotch coal-fields; it is not of the smallest interest to us, except so far as it bears upon the price of gas. You told us that, in the years as to which you have just been giving your evidence, the average price was 16s. 3d., minus 2s. or thereabouts for residuals. What we want to know was to the coming year—what will be the average price, and how much we are to deduct from that for residuals. That is all we care about.

Witness: I think I might venture to say——

Mr. HOPE SCOTT: If we could get the different qualities of coal and the price, we could easily work it out. The committee shall have it prepared.

Examination resumed: Beside the question of price, we decidedly had a difficulty in procuring the quantity we needed. The demand for coal for gas purposes has increased considerably of late years in Scotland, owing chiefly to its being purchased for shipment abroad, and taken away from us for improving the illuminating power of the gas in London and elsewhere.

Mr. HOPE SCOTT: In your opinion, has the prescription by Parliament—ordinarily in English bills, at any rate—of a universal illuminating power, acted upon the cannel market?

Witness: Most decidedly, in advancing its price. Supposing 18-candle gas were to be required from the companies in London, that would of course give a great impulse to it.

By the COMMITTEE: I understand the colliers wages have increased considerably.

Cross-examined by Mr. WEBSTER: I made the application to the coal-owners in January, in consequence of our anxiety to make sure of our supply for the ensuing year; but some of the Scotch gas companies are in the habit of making their contracts fall at different periods of the year. They are very general about April and May; but I know a very important company whose principal contracts fall at the 31st of December, and are renewed the same time as ourselves. There have been several new cannel-pits opened lately. I should think it is only the best cannel that is worth bringing to London, or the best varieties of the second class. I do not know whether I would bring to London cannel that was less than 15 candles. The applications to the different companies were made within the last eight or nine months. That would be after the report of the select committee of last year, if it was made in July. Part of the applications were made by myself as manager and engineer, and partly by our treasurer.

Mr. WEBSTER: In fact there has been—I will not say a combination, but a general agreement to raise the prices in Scotland, has there not?

Witness: No; we have been comparing notes with each other as to the cost of coal, but there has been no combination in any way. There has been a rise in the towns I have named.

Cross-examination continued: Dundee is a large town, and Aberdeen is a large town; Hamilton is not very big. I do not know what dividends those companies are paying, nor what their capitals are. I only know the price. I do not know anything particularly of the illuminating power. On the average of the year's work the quantity of gas produced might be taken at 10,000 feet per ton of cannel, of an illuminating power of from 25 to 27 candles. "Cannel" and "Parrot" are synonymous terms. "Parrot" is the old name. I do not know whether Boghead is a cannel coal. We call it a coal. It has the properties of cannel as regards gas-making in a highly developed degree. It has a very high illuminating power. The two companies in Edinburgh compete with each other. The other company is the oldest. There is no special arrangement between us for districting. Possibly there is a general understanding. We do not tread too much on other people's toes; we do not like to do that. There is not much difference between the illuminating power of the two companies. Sometimes one and sometimes the other is the best. I cannot say that as a general rule the old company is better than the new. I will not say anything about it. The price is the same. There is not a great deal of variation in the level of Edinburgh, but there is a good deal of difference between the level of Edinburgh and Leith. Princes Street in Edinburgh is about 225 feet above the Ordnance datum, and the castle is about 350; that is about the range. I have read part of the evidence with reference to the unaccounted-for gas in the Chartered—18 per cent. I do not think that is a very large quantity for London. The levels in London are pretty much the same, but there are circumstances there that form leakage which do not exist with us. With us, at present, it is 15·82; it has been as high as 20.

The CHAIRMAN: I suppose there should be less loss upon a higher illuminating power?

Witness: It is a denser gas with a higher illuminating power, and through a given aperture it flows in a less quantity than a thinner gas, but I do not think it should make much difference.

Cross-examination resumed: I do not know how many Scotch gas companies there are under Acts of Parliament, but there are several. I cannot speak as to whether they are under restrictive clauses or not as to price and illuminating power.

Re-examined by Mr. HOPE SCOTT: Glasgow and Dundee are under parliamentary powers; I do not know whether Perth is or not. Any difference of level there affects the gas, but that is diminished to some extent by the greater density of the gas. We have not been able to get below 16 per cent. or thereabouts. I do not know the level of Highgate, nor can I say that one of the London companies supplies that district. We paid 8 per cent. dividend for one or two years previous to last year. Last year we reserved our profit, which amounted only to about 4¾ per cent., by consent of the shareholders, it being anticipated that a considerable extra expenditure would be incurred from the price of coal.

By the COMMITTEE: We had a declaration of profits, but it was not divided.

Re-examination resumed: It was thought more prudent to keep that in hand to meet extraordinary expenses, of which the rise in coal was one of the large elements. The other company paid, I think, 10 per cent. We advertised our prices quite independently of our opponents, and they advertised independently of us, but the prices advertised were the same.

Mr. HOPE SCOTT: Supposing that the mains of the old company are in a street in which you are not yet, I suppose you would not think it handsome to lay down a pipe there?

Witness: Not unless there were good grounds for justifying it.

Mr. HOPE SCOTT: In other words, without what my learned friend calls "districting," you practically agree to divide the business in Edinburgh between you, I suppose?

Witness: Yes; but we have our mains in Edinburgh and Leith in every street. Both companies have, I believe, with very few exceptions indeed.

Mr. WEBSTER (through the committee): What is the mileage of mains of the Edinburgh and Leith Company?

Witness: We had 120 miles about four years ago, and I think have added another 8 since.

The CHAIRMAN: Do you agree with the doctrine that 2½d. a candle is a fair test of price?

Witness: I have never calculated it in that way. We supply now 25 to 27 candles.

The CHAIRMAN: Would it answer your purpose to go from that 2½d. a candle to a lower figure?

Witness: If we were to reduce our candle power, say, to 15 or 16, it would be equivalent to adding greatly to the cost of our plant. It would require very largely increased works to produce the increased quantity that would be required to supply our consumers.

The CHAIRMAN: Then you do not agree with the doctrine that upwards or downwards you may take it from 14 to 18 candles at 2½d. a candle?

Witness: I could not state as to the rate per candle; I have never taken it in that way.

By Mr. HOPE SCOTT: We purify by the process of lime purification. We have no standard of purity irrespective of the standard of price and illuminating power.

By the COMMITTEE: We are fortunately situated closely upon the seashore, and we run our lime water, which is the most offensive of our products, into the tide-way by a pipe. The neighbourhood is sufficiently inodorous as it is, by other establishments.

By Mr. WEBSTER: We manage to get all our lime disposed of for farming purposes. The dry lime is carried away by carts. The wet lime, which is called "blue billy" in London, is allowed to settle in close pits, and the liquid is run off till we find the lime in a thick plaster state, and then we send it away by railway.

Mr. *John Young*, examined by Mr. BURKE.

I am engineer to the Dalkeith Gas Company. I have been a gas engineer 27 years, and of that 14 years have been spent in the service of the Dalkeith Company. That company has the monopoly of the supply. We use entirely cannel. Our make is about 11 millions per annum. We are under no Act of Parliament, and have no limitation as to price, illuminating power, purity, or dividend. We do as we like. We use six or eight kinds of cannel. We find that we have sometimes to use one coal for the quality of the gas, and sometimes another. The average produce from a ton of coals, on the compound coal system, is about 10,000 cubic feet of from 25 to 26 candles illuminating power. I agree with what the last witness said about the variation of quality in the coals. In winter we have to use a higher and better description of coal than at other periods of the year. Our leakage in the year ending 1865 was 13 per cent. odd; last year it was 15 per cent. odd. I attribute that to no particular reason; we have no assignable cause. In the term "unaccounted-for gas" we include gas lost by leakage, exhalation in the pipes, gas precipitated in the pipes, and the form of oil, and stolen gas. We supply the public lights by meter. I could not assign any particular portion of that 15 per cent. to leakage alone.

Mr. BURKE: From your long experience as a gas-maker, does it invariably result that the amount of gas sold would be less than the manufactured gas?

Witness: Invariably so. I know of no instance where it has ever been under 10 per cent., and I have known it as high as 33 per cent.

Examination continued: We sell our coke at 2d. a bushel. About 10 bushels would go to a ton of coal consumed. We sell about half our coke. We also sell our other residual products. We get for those £65. We charge 5s. per 1000 feet for our gas, and have hitherto paid 10 per cent. dividend. We have paid the same dividend for the last 13 years. I have found, as the previous witness has stated, that the price of cannel has been rapidly increasing for the last 15 years.

The CHAIRMAN: I suppose that is not disputed—the facts that have been stated.

Mr. BURKE: In your judgment, if these Scotch cannels were required to be sold in large quantities in London, would that have an effect upon the price in Scotland?

Witness: It has already affected the price materially.

Mr. BURKE: Supposing there was a compulsion put upon the London companies to sell cannel gas, and to compel the companies to get cannel, whether from Scotland or Lancashire, or elsewhere, would not that have the effect of raising the price in Scotland?

Witness: Yes, most undoubtedly it would.

Examination continued: For the last ten years I have been employed largely in analyzing coal. I have examined 200 samples. A great number when they were tested were found useless. In 1865 I paid for the Lothian coal 20s. a ton at the pit. That is the coal Mr. Romans represents. Now we are paying 25s. at the pit. We have to carry it about 3 miles. That is a first-class cannel. All the cannels have been affected in price, though in different ratios.

Mr. BURKE: Is the ownership of the cannel coal comparatively in few hands?

The CHAIRMAN: The committee have determined not to go into that inquiry.

Examination resumed: I know that several companies in Scotland have increased their price in consequence of the price of cannel. Our company has not done so yet; it is left in abeyance till the end of our present financial year, to be considered then. They have not yet taken into consideration whether it will be absolutely necessary to increase the price in order to maintain the dividend. I am not acquainted with the coal supplied to London, or its illuminating power. There are great varieties of Newcastle coal. I have had two kinds of common coal for analysis, and one of them produced 10,000 cubic feet per ton, of 8-candle gas only. The other was from Plashetts; that was rather over 10,000 feet of 12-candle gas. Those are the only two I have examined; they are called soft coal. I am not acquainted with the Durham coal-field, from which London is supplied.

Cross-examined by Mr. RODWELL: The capital of our company is now £6000, but we have only paid dividend upon £4500, as the remaining £1500 has only lately been paid up. We have charged 5s. per 1000 for the last four or five years.

Mr. RODWELL: What is the highest price you have charged since you have been paying 10 per cent. dividend?

Witness: For some little time the lowest price was 5s. 10d., and the highest 6s. 6d., for gas of about 25 or 26 candles. I do not make gas from Newcastle coal.

Mr. RODWELL: You have been asked whether you could get 10,000 cubic feet from the Newcastle coal of a certain illuminating power?

Witness: I have not been asked that.

Mr. RODWELL: You say there was some coal from which you got 10,000 cubic feet of gas of only 8-candle power?

Witness: They were coals sent to me for analysis, upon which I reported.

Mr. RODWELL: If you had been content with a smaller quantity of cubic feet from the same coal, would you have got a higher illuminating power?

Witness: I should say slightly increased—probably by two candles. That would take the power up to 10 candles. In order to get beyond that we must have coal mixed with cannel. I have not made any calculation of how much per candle would be the increased cost.

Mr. RODWELL: Do you subscribe to the doctrine that for 2½d. a candle it could be done?

Witness: I can give no opinion upon that.

Re-examined by Mr. BURKE: The Plashetts coal that I tested was inland coal, and could only be brought to London by railway. I am aware that the coal brought to London is partly by railway and partly by sea, in competition with each other. Our company has been in existence upwards of forty years. Our streets are paved with stone.

Mr. *Horatio Brothers*, examined by Mr. DENISON.

I am engineer of the Equitable Gas Company, and have been so for eight years. Previous to that I was seven years at the Salford Gas-Works. The Equitable Company was founded in 1830, and incorporated in 1842. Up to the end of last December we had expended capital £250,400 odd. Of that £250,000 was spent before the Act of 1860. We have only one station at Pimlico. We supply both kinds of gas. I believe at one time the Equitable Company was in competition with the Chartered, but that was before my time. I came after the districting was arranged. I know about the past dividends. From 1840 to 1842 they paid no dividend. From 1848 to 1849 they paid no dividend likewise. I do not know what they were doing between 1848 and 1849. For the first 20 years the average dividend was under 3 per cent. For 1866 our rates, meter-rents, and other things which we received, amounted to £94,075 6s. 8d., including residual products. Our working expenses were £61,958 15s. 8d.; our net profit, £39,016 11s. We made our last reduction in price at Midsummer. We reduced our cannel gas from 6s. to 5s. 6d., and common gas from 4s. 6d. to 4s.

Mr. DENISON: As last year was rather a critical period, I must put another question. You had given notice the year before of your intention to do so?

Witness: We had done so.

By the COMMITTEE: The price was reduced at Midsummer, 1865, but we gave notice at the latter end of 1864.

Examination resumed: I have a paper here showing the dividends as they were going on a little before 1860. In 1856, just before the districting, our dividend was 4 per cent.; in 1857, 4½ per cent.; in 1858, 5 per cent.; in 1859, 6 per cent.; and in 1860, 9 per cent. Then came some payments of back dividends. In 1861 we paid a back dividend of 5¼ per cent.; in 1862, a back dividend of 4½; in 1863, a back dividend £4 9s.; in 1864, a back dividend of 6¾; in 1865, a back dividend of 3¾; and in 1866 none.

By the COMMITTEE: That is in addition to the 10 per cent.

The CHAIRMAN: There is an item here of £17 10s. per cent.; what does that mean?

Witness: The return I have put in is a return put in my hand by the accountant.

Mr DENISON: That seems to be for one half year, not for the whole year?

Witness: Not for the whole year.

Mr. DENISON: Is that the explanation of the 17½ which appears upon that printed table—that it is for the half year only?

Witness: Yes, for one half year only; for the whole year it is 13¾. In 1866 in neither half year did we pay any back dividend.

Examination continued: The illuminating power by the Act of 1860 was 12 candles, but we have always given more than that; and for the cannel gas we have given 4 more candles on the average, making 24 candles.

Mr. DENISON: There is another question relating to these back dividends; although you have paid these sums, you have not paid off all that you might have done under the Act?

Witness: No, we might have paid more; £22,000 it is exactly.

Examination continued: We have erected the testing-house according to the Act, and placed it at the disposal of the examiners in the regular way. There have been no legal processes against us for a breach of the Act, nor any inquiry from the Home Secretary, nor action by the magistrates. The parishes of St. George, Hanover Square, and St. Martin-in-the-Fields have appointed examiners. The Strand district did appoint an examiner also, but they have discontinued him. There has been no complaint from those places that have appointed examiners. I have a statement of the details of the working.

Mr. DENISON: Now, first, as to economy. I asked Mr. Jones the other day whether there was any way of saving money, either in distributing gas or making it, and I ask you the same question?

Witness: I answer it in this way—that I have had a considerable experience in the country, and an experience of more than six years in London, and I must say that in managing the works in London I have carried them on as economically as I did in the country, and I have always been able to make a first-class dividend in the country as well as here. I am sure there is no waste. The 10 per cent. we paid last year was only just earned. We had to put on all steam to earn that dividend. The price of our coals has risen the same as other people's. There is no proportion between the residual products and the cost of coal. Breeze is the small coke, when the coke is riddled. Last year we got 8s. a chaldron for it, now we cannot sell it for 1s. 6d. I do not believe that anything under 4s. per 1000 will enable us to pay our dividend with the present price of coal. The average of our common gas is 14 candles, that is two more than the number required.

Mr. DENISON: I am sorry to find that you, like other gentlemen, cannot give a separate account of the cost of making cannel gas, distinct from the other.

Witness: I have been anxious to do it, but, owing to the make of cannel gas being so small—merely one-eleventh of the whole—it would have put us to considerable expense to do so, or I would have done so. A great many things would have to be attributed to both manufactures—a great many fixed charges; and if we attempted to work out the mere cost of making the gas we should have to make an arbitrary division of taxes and fixed charges of all kinds; so that we cannot practically do it. Tar and ammonia, and other things from both gases, flow into the same reservoir, so that they cannot be separated.

Mr. DENISON: You engineers have some difference of opinion upon this point which I am going to ask you, but what is your view as to the waste of cannel gas as compared with common gas, is it greater or less?

Witness: In our case it is 1 per cent. greater.

By Mr. WEBSTER: That is the "unaccounted-for gas."

Mr. DENISON: How much do you put as what we call leakage—which means unaccounted-for gas—upon the whole of your mains?

Witness: We vary particularly on that point; the unaccounted-for gas really amounts to 12·8 per cent.

Mr. DENISON: That is close upon what the Phœnix was?

Witness: Yes; we burn about 5½ millions upon the works and in the offices, which brings it up to 14·1 per cent.; that includes the cannel.

The COMMITTEE: That is consumption, not leakage.

Witness: I mean that which is unaccounted for—not paid for.

Examination resumed: That includes what we burn ourselves and what actually leaks out of the pipes, and also the stealage, and whatever else there may be.

Mr. DENISON: There is another item. I suppose you find, like other people, that meters do not register sometimes so much as they ought?

Witness: That is perfectly true, especially as regards dry meters. Our dry meters are increasing.

By the COMMITTEE: The mistake would not always be on one side, but the average would be against the dry meter.

Mr. DENISON: Looking at the machinery of the meter, I suppose it is

easy for you to say what is the natural tendency of the mistake, as to whether it will register more or less gas than is used?

Witness: The wet meter, when it once gets the water-line perfect, so long as the meter goes on registering the quantity going through the meter, is perfect; but the dry meter, what with the slipping of the valves, and the diaphragms, being flexible, increasing in size, though they register a similar quantity, they practically give more.

Examination continued: I have made an estimate of the cost of supplying 18-candle gas. It adds 1s. 2d. to the present cost, comparing it with 12-candle.

Mr. DENISON: That is to say, an addition of 6 candles is equivalent to a difference of 1s. 2d.?

Witness: Taking it in that way there is that difference. There is a difference of 6 candles whichever way you put it. One is 13 and the other is 19. If we were obliged to furnish 18-candle gas, and also to reduce from 4s. to 3s. 6d., we should have no profits. I do not think we should be able to pay our way. Our consumption has rather increased of late years, but very little—about 5 per cent. upon the previous year.

Mr. DENISON: That is to say, we may call it 5 per cent. compound interest?

Witness: Yes.

Mr. DENISON: Do you believe, as far as you can judge, that any reduction of the price would increase the price in such a way as to compensate for that reduction?

Witness: I do not think it would.

Mr. DENISON: You answer that by experience, and not by theory. Has the increase of last year, which was a little more than 5 per cent., at all made up for the decrease in price?

Witness: No; we have not practically found that the reduction has increased our consumption; we have got the usual increase.

Mr. DENISON: It lowered your dividend from 15 per cent. last year to 10 per cent.

Witness: It did not lower our prices considerably.

Mr. DENISON: Now about Dr. Letheby and his burner. You know the statement of last year, which I suppose my learned friends will read, about his burner?

Witness: Yes. I think that evidence of Dr. Letheby's about the burner had reference to the City only. Dr. Letheby is referee for the City, and he so described himself. The burner was a 15-hole Argand burner for the common gas, and a bat's-wing burner for the cannel gas. We had the same burner in 1860 as we have now. Nobody has accused us of decreasing our illuminating power, and we have not decreased it. My returns for the common gas between 1860 and 1866 show an increase of 5 per cent. in cannel, which must show an increase in illuminating power. I know that Mr. Cleminshaw said the loss by leakage, and the labour consequent upon that, ought not to be more than 1s. per 1000.

Mr. DENISON: I believe yours is 1s. per 1000. He estimates loss by leakage and labour at the present time to be 1s. per 1000 in Manchester; then he compares the mains in Manchester with the mains in London. When you districted in 1857, or as soon after as could be, were all the spare mains taken up?

Witness: Yes; all the mains that we could do without, and that we could take up without inconvenience to the public.

Mr. DENISON: So all that story of his about there being so many mains in the streets is not correct as to your company?

Witness: It is not correct in the whole; we have no mains down at present in use of the company's that we have not tested before using. In a large street there ought to be two or three mains at least, and where we supply cannel gas there must be four. If we take the Strand, we could not do with less than one large main in the centre and two riders on each side, and a cannel-gas main.

Mr. DENISON: About turning on the gas. We have had some evidence about that. We know that you are obliged to keep it on a pressure of 1 inch all day long. Is that the case in any other town that you know of?

Witness: No, it is not the case in any other place; and we having a very large day consumption, and having the principal portion of the theatres to light, especially during the pantomimes, we practically work with a 15-10th pressure during certain hours of the day.

Examination continued: Our loss by unaccounted-for gas amounts to 4d. per 1000 feet, and I know enough of the figures of other companies to say that is about the average. I was one of the five engineers who signed the estimate sent to the Board of Trade. I have given the same evidence here in substance about the 18 candles.

Mr. DENISON: There was another statement of Mr. Cleminshaw about the charge for some coke. It relates to the same table I have been speaking of just now. Mr. Cleminshaw said there was a mistake about it.

Witness: The mistake is this, that we had charged more for Newcastle coke than we had made—it is against ourselves. We should have to use considerably more cannel coke. We should have had to double the quantity; that is, for the difference. On taking 12 bushels of Newcastle coke we should have had to use 24 bushels of cannel coke. In making our cannel gas we use as a base, as I may call it, Wigan cannel, and to bring up the quality we use either Boghead or Lesmahago. In addition, I practically find that I cannot guarantee a supply of 20-candle gas, according to the Act, with Wigan cannel alone. In that we use no Newcastle coal at all.

By the COMMITTEE: The cannel gas is for private consumption in the south-western districts, and also in the Strand.

Examination resumed: Supposing we had to guarantee 18-candle gas, we should require three-fourths Wigan cannel and one-fourth Newcastle coal. That is what we give in the table Mr. Clemiushaw is criticizing—Wigan and cannel, quantity 1 ton, 16s.; and fuel to carbonize as above, 12 bushels at 3d. We add that up, and make the net cost of 1 ton of cannel £1 1s. 4d. I heard Mr. Cleminshaw dispute those figures, and was rather astonished at the statements he made as to the quantity of Newcastle coal and Wigan cannel from which he could produce 19½-candle gas. I can only say that I was on one side of the water when he was upon the other, at Salford, and I know this, that we were never able to do it; and I know that our returns at the time show that we always made a greater profit than they did. I can say this further, that during the winter season, when the cannel has been damp and small, the illuminating power from our cannel has fallen down to 18 candles.

Cross-examined by Mr. WEBSTER: Last year we consumed 42,298 tons of coal and cannel. I can distinguish between the two. In the year 1866 we used 37,342 tons 19 cwt. of Newcastle coal and 4656 tons 15 cwt. of cannels; those cannels included Lesmahago and Wigan. Of Boghead we used 351 tons 13 cwt. The power of the Boghead is upwards of 40 candles. The total cost of all the coal was £35,182 18s. 1d.; and the total amount received for residual products £16,961 19s. 8d.—nearly half. We made for that sum 425,000,806 cubic feet, and sold 365,000,653 cubic feet. We received for that £75,906 13s. 8d. not including the residuals. Upon the quantity of gas sold we require 1s. 7½d. per 1000 feet to pay a dividend.

Mr. WEBSTER: There seems to be some question put advisedly about this burner of Dr. Letheby's applying to the City; I suppose what is a good burner for the City is a good burner for any other town?

Witness: For any other company supplying the same quality of gas.

Mr. WEBSTER: There is a difference in the burner, as regards the quality of gas, is there not?

Witness: There ought to be.

Mr. WEBSTER: Are you not in the habit of asking for deposits to secure the gas-rents?

Witness: That does not come in my department at all; I never meddle with financial matters.

Mr. WEBSTER: What is the number of miles of main?

Witness: We have upwards of 60 miles of main.

Mr. WEBSTER: What is the quantity of gas supplied per mile?

Witness: If you take the rental at £76,000 and the mains at 60 miles, it is getting on to upwards of £1500 a mile.

Mr. WEBSTER: You told my learned friend that there was no ratio between the cost of coal and the residual products; do I understand you to say that the residual products do not increase in value as the price of coal increases?

Witness: Decidedly not.

Mr. WEBSTER: So that, if coal rose very much, coke would fall?

Witness: No; I did not say so. I did not say that the reverse was true.

Mr. WEBSTER: Then, in the answer you gave, you did not mean to say that if coal rose coke would not rise?

Witness: I meant to say this, that it does not necessarily follow because coal rises in value, that the residual products rise in value.

Mr. WEBSTER: We are not talking of residual products now, except coke. Do you mean to tell me that, assuming Newcastle coal to rise, the coke would not rise also?

Witness: It does not do so. It has not done so this year, especially. It is quite a question of the price of other material. Coke depends a great deal upon the supply and the season.

By the COMMITTEE: When I was at Salford the illuminating power we supplied was 18 to 21 candles, as far as my recollection serves me. We reduced the price a little before I left; we set Manchester the example, and they followed it. The price, the greater portion of the time I was there, was 5s. per 1000. If my memory serves me, we reduced the price to 4s. 6d. It was 18-candle gas—occasionally a little more. The cost of Wigan cannel at that time was about 14s. or 14s. 6d.; it had been 10s. 6d. There is a great difference between the price of labour at Salford then and the price in London now. It would be nearly 20 per cent., as well as I can remember. We separate the selling of cannel and common gas, because we have separate mains. We could separate the expense of making the two, but at a very considerable outlay.

The COMMITTEE: You cannot tell your directors whether it pays them better to furnish cannel gas or coal gas at these respective prices?

Witness: I might reply to your question by rather a general answer, and that is, that with the small quantity of cannel we make I believe it would be better for us to supply common gas; but if we were able to make the whole quantity of cannel I should prefer to do so, at the price of 5s. 6d. That is at the standard of 20 candles. We now pay regularly 10 per cent. dividend; and besides that we have paid all the back dividends we are entitled to—that is to say, except £22,000.

SEVENTH DAY—TUESDAY, JUNE 4.

Mr. *Henry Finlay*, examined by Mr. RICHARDS.

I am a civil engineer, and have been engineer-in-chief to the Surrey Consumers Gas Company for 5½ years. For 9½ years previous to that I was assistant engineer to the Commercial Gas Company. I am thoroughly familiar with the manufacture of gas, and the erection of gas machinery. The Surrey Consumers Company was founded in the year 1849, and incorporated about 1854. They supply only common gas—no cannel. We have one manufacturing station, and two gasholder stations. The manufacturing station is at Rotherhithe, on the banks of the Thames. That situation is extremely good for the delivery of coals. We bring the ships alongside the jetty, without the intervention of barges. We originally commenced to make gas in competition with the Phœnix and South Metropolitan Companies. That continued until about 1853 or 1854, when the districting took place by agreement. For the first three years after starting we paid no dividend; in 1852, we paid 4½ per cent.; 1853, 7 per cent.; 1854, 7 per cent.; 1855 to 1861, inclusive, 8 per cent.; 1862, 10 per cent.; and in 1863 we paid 10 per cent., and 4 per cent. back dividend.

By the CHAIRMAN: That would be for two years. In 1864 we paid 10 per cent., and 3 per cent. arrears; in 1865, 10 per cent., and 2 per cent. arrears; and in 1866, 9½ per cent., and 2 per cent. arrears. We reduced the price of gas at Midsummer last, and since then we have only been enabled to pay 9 per cent.; and 2 per cent. was paid on the previous half year. The reduction was 6d.—from 4s. 6d. to 4s.

Examination resumed: From the commencement of the company in 1849 our dividend has averaged 7⅜ per cent. Our capital is £245,643. Our subscribed capital is £200,000; the remainder is borrowed. In 1862, when I first became connected with the company, the share capital was £150,000, and the borrowed money £35,000; the rest has been spent since. The gross receipts for the year 1866 were £76,553 15s. 8d.

Mr. RICHARDS: That does not agree with what I have got. Just look at that paper before you.

Witness: That may be a balance carried forward possibly; this is what was returned to the Home Secretary.

Mr. RICHARDS: Look at your own paper, and give the gas-rental.

Witness: £75,860 19s. 3d. The working expenses of the company for the same period were £50,979 0s. 10d., leaving a profit of £24,881 18s. 5d.

Mr. RICHARDS: And the dividend paid, how much per cent.?

Witness: The gas-rental, with incidental receipts, includes the residual products. For the first half of 1866 we paid 2 per cent. arrears, and 5 per cent. dividend. We made the reduction at Midsummer, and then for the second half year we paid 4½ per cent. We came under the operation of the Gas-Works Clauses Act in 1854, when we obtained our Act. It was an association before. Our standard illuminating power is fixed by the Act of 1860 at 12 candles. We have always maintained something above the standard; the gas over the district has averaged about 13 candles, as tested by the local authorities. St. Olave's and Rotherhithe appointed Dr. Vining to test the gas, but it being found equal to the standard, Rotherhithe dispensed with his services about three years since.

Mr. RICHARDS: When you quote your illuminating power, you quote what he has returned adversely to the company?

Witness: Exactly.

Examination continued: In the year 1862 we used 376 tons 13 cwts. of Wigan, 294 tons 6 cwts. of Scotch cannel, and 225 tons of Boghead. In 1863 we used 1200 tons of Wigan, 125 tons of Scotch cannel, and 139 tons of old Wemyss. We have been forced to use different sorts. We used to use Boghead, but it is too expensive. Our per centage of cannel on Newcastle coal was about 5 per cent. We cannot get rid of the Scotch cannel coke; we give it away, and have to pay for carting it off. The other cannel coke I use as much as I can in the works under the boilers, and for our jetty for lifting coals. We have practically no sale for it. I have gone into the question of the cost of our gas—it is 29·94d. per 1000 feet. That includes everything but the dividends and the bonds. That is gas sold at the consumers meters. We put the leakage—that is to say, unaccounted-for gas—at 16¾ per cent. We require about 16·33d. per 1000 to pay the dividend, and 1·73d. for the bonds.

By the CHAIRMAN: That is to pay the 10 per cent. It is as near 1s. 6d. as possible.

Examination resumed: Adding the 1s. 6d. and 2s. 6d. together makes 4s. We have never put by any reserved fund—we never had any to put by. When we reduced our price we were under no legal compulsion to do so. Before we put by our reserve-fund under the Act of 1847 we are expressly permitted to pay our back dividends. The directors and auditors fees and salaries to officers is 2·17d. per 1000 feet. That would not include my salary, that going under the head "Supervision and labour." The companies necessarily do divide many of those items differently. I put down 9500 feet as the natural production of a ton of Newcastle coal. The quality depends on the description of coal—12 to 13 candles.

Mr. RICHARDS: When you hear of 10,000 feet of 15-candle gas, is that within your experience?

Witness: No; if you attempted to do it you would do it at a great loss.

Mr. RICHARDS: You could, perhaps, do it from the choicest coal, but it is out of the question practically?

Witness: It would need to be very choice indeed, I should say.

Mr. RICHARDS: Now, with regard to the burner that has been employed, when you talk of producing 13-candle gas, are you speaking of any special favourable burner, or the burner which was in existence before the year 1860 as well as since the year 1860?

Witness: Any burner that was in existence before the year 1860, as well as since that year. There have been, and still are, burners in existence that may be used for deteriorating the quality of the gas. I could give instances of two burners apparently alike, one producing 13 candles, and the other 15.

Mr. RICHARDS: Mr. Cleminshaw speaks of the loss by leakage, and the loss in distribution; what do you say is the leakage and loss by distribution in the districts supplied by you? Do you believe that there is any waste of capital in your distribution, or that you could improve it, looking at the position of your works and the district to be supplied?

Witness: During the last five years I have examined nearly all the mains; wherever there has been a defect in a main taken from other companies I have taken it up and relaid it. I think there is very little defect.

Mr. RICHARDS: Have you any duplicate mains lying charged with gas, but doing no duty?

Witness: No; that is simply nonsense.

Mr. RICHARDS: Did you ever hear of such a thing in London?

Witness: It is nonsense; the companies would not charge mains that were of no use.

Mr. RICHARDS: You told us your unaccounted-for gas was 16·33 per cent. Will you tell us how much you can fairly put down to leakage proper, and how much to gas burnt on the premises, and various other things?

Witness: That is a very difficult question, but I should not say that there is more than 5 or 6 per cent. of loss from the main-pipes. Ours is a poorly populated district, with small houses, and of course our leakage would be larger than some companies. A very large item in unaccounted-for gas is the gas lost by condensation. The gas goes into the gasometer under a hot sun, and is then passed through the meter after going through the cold pipes at night.

The CHAIRMAN: Then comparing your district with the Manchester district, is there any reason, and if so, what reason, why there should be more loss by condensation in your district than there is in Manchester?

Witness: I do not know the mileage of mains in Manchester, but ours is a very poor district, and we have rather a large mileage. For instance, the Deptford authorities gave us an order to lay on 20 or 30 lamps the winter before last, and every lamp cost us £20 for the main, and there was no other consumption.

The CHAIRMAN: Do I understand you to say that, if there be any reason why in the metropolis a larger amount of leakage should be allowed than in Manchester, it is limited to those parts of the metropolis where the population is very thin?

Witness: I think it should be.

Examination resumed: That is with regard to condensation. The leakage through the pipes would vary according to the length of mains, of course, and also from the traffic over the mains. Some districts are very much worse than others, where the disturbing causes are greater.

By the CHAIRMAN: We have about 60 miles of main, averaging about £1000 a mile.

Examination resumed: Our total make is about 1,800,000 cubic feet in 24 hours in mid-winter.

By the CHAIRMAN: Our total make for the year is 353,470,000 cubic feet.

Examination resumed: The same thing happened in Bermondsey district as in Deptford, with regard to the public lamps. I am not quite sure that we were forced to do it under the Act of 1860, but we did it. If the parish authorities agree to put up lamps every 75 yards, they may take us where they like in the district, but some of them were further apart than 75 yards.

Mr. RICHARDS: Do you believe it possible for the London companies to supply 18-candle gas at 3s. 6d. per 1000 cubic feet, and live?

Witness: No; I should think that they would starve at that, and could not do it at all. It would be a decided loss, in my opinion.

Mr. RICHARDS: They would starve so fast that they would die?

Witness: I should say so.

By the CHAIRMAN: We used altogether 37,207 tons of coal, of which 5 per cent. was Scotch and mixed cannel.

Cross-examined by Mr. RODWELL: Our company is more disadvantageously placed than the City companies and some other companies. I should think the City companies leakage ought to be less. The cost of manufacture would be about the same.

Mr. RODWELL: What is your disadvantage, then, except the one point—viz., the distribution of mains?

Witness: For every £100 that our rental is increased we have a very large outlay of capital in the mains. In that respect we are working at a greater disadvantage than the City and some other companies.

Mr. RODWELL: With all those disadvantages, you have been paying, we see, a very considerable dividend?

Witness: Yes.

Cross-examination continued: If you have calculated that our dividend since 1860 is something like 11½ per cent., it is quite right. Up to 1862, when his lease was out, we had to pay Mr. Croll something for an interest he had in the gas-works. The company then took the tools and utensils. The payment to Mr. Croll appears in the accounts. You will find it in this way: it was paid off at the rate of £1600 per annum, and you will see it in the balance-sheets at the rate of £800 every half year. The value of our shares now in the market is about £12, I think. They are £10 paid, and are at £2 premium.

By the COMMITTEE: We do not lose much by bad debts in our poor district. I think it is rather under some of the other companies.

Cross-examination resumed: The money we had to appropriate for dividend was nearly the same in 1865 and 1866. It was £24,035 in 1865, and £24,881 in 1866. We reduced our price from 4s. 6d. to 4s. at Midsummer. We charged 4s. 6d. at the time I began with the company in 1862, and charged the same continuously up to June, 1866. Our increase in the quantity of gas supplied in 1864 was 8 per cent. over the previous year; in 1865 it was also about 8 per cent.; and in 1866, after we reduced our price, it has only increased at the rate of 6 per cent. It has not increased so much as before. I cannot account for that. Certainly the reduction in price has not induced the consumers to burn more gas; it is rather less.

Mr. RODWELL: Do you know from your experience of other companies if, when the gas is reduced, there are more consumers?

Witness: I heard the engineer of the Equitable say so yesterday; but I am sorry to say my own company's increase has been less since we reduced the price.

Cross-examination continued: The item "Supervision and labour," includes the whole of the working expenses of our yard—the workmen's wages, my salary, and the inspector's salary. It includes repairs, but it would not include the expense of laying down new mains, attending to escapes of gas, and such like matters. There has been a large increase in wages between 1864 and 1866; they have increased about 10 per cent. That appears in the accounts. The total cost of supervision and labour in the half year from Midsummer to Christmas, 1866, is £5190 3s. 1d.; and for the corresponding half year in 1865, £4829 3s. 8d. The quantity of gas made is 353,473,000 cubic feet, and the quantity sold 294,332,000 cubic feet, being a loss of 59,141 cubic feet.

Re-examined by Mr. RICHARDS: As we extend our works it becomes necessary to employ more people, so that year by year the item "Supervision and labour" must increase necessarily.

Mr. RODWELL: That is distributed over the quantity of gas sold.

The CHAIRMAN: There is a certain increase in the quantity of gas made each year, and then we are told what the actual sums paid for labour were in those two half years.

Witness: Yes; and we naturally expect an increase in the amount.

Re-examination continued: My directors every half year go very carefully through the sums expended, and make comparisons. The stokers wages we raised from 2s. 6d. to 3s., and all the yard men we raised at the rate of 10 per cent.

Mr. RICHARDS: Have you had any recent application from the stokers for a rise of wages, or for the diminution of the hours of work from 10 to 8 hours?

Mr. O'MALLEY objected to the question.

The CHAIRMAN said they did not want more detail than was necessary, otherwise they might go on with the inquiry for ever.

Mr. RICHARDS: I will not press the question if you think it undesirable.

By the COMMITTEE: There is no want of employment in our district. We adjoin the Surrey and Commercial Docks, and when the men leave our establishment they can go there and get work. We use about 5 per cent. of cannel, and give 13-candle gas over our district. We make our gas at the works 14 or 14½ candles. If we were to give 14 or 15 candle gas throughout our district, it would cost us an additional 2¾d. or 3d. a candle. It would require the same rate to carry it to 18 or 20 candles. I have never gone into the question beyond that, so cannot say what would be the increase. Our district is poor, but the situation of our works is rather favourable, being upon the banks of the river. If I were going to select a site for the metropolis generally, I should go rather farther down the river. I think about North Woolwich would be a very good site. I would carry a long main into the crowded parts of the metropolis, and then supply from that main. I have not calculated very accurately, if something of that sort were to be done, what price the gas could be produced for. It would depend very much on the quantity made, and the magnitude of the company. If you were to have a fusion of the London companies, you would do away with expense to some extent, and it would affect the price of gas, but not largely. I have not gone into and considered the question.

The CHAIRMAN: When you made your districting arrangements, did you compare notes, the one company with the other, with regard to the relative advantages of the companies?

Witness: No; I was in the Commercial Company at that time, and we never had any opposition there. The districting took place on the south side of London before my connexion with the Surrey Consumers Company. I succeeded Mr. Croll.

The CHAIRMAN: But if a new company had been admitted to start, and had made large works where that red place is on the map, and had carried its main into the City, and had supplied there a large and crowded district, can you tell us at what price they could have furnished the consumers with gas?

Witness: No doubt they could have done it at a cheaper rate than it is now, but I cannot pretend to say.

By the COMMITTEE: Our capital is not fully paid up; we have power to call up £40,000 more. We have raised by loan £42,000. We made a call on the 1st of January last of £10,000, which makes our present capital £210,000, and £42,000 loan at 5 per cent.; but we cannot get the bonds off, though we have advertised them.

Harry Chubb, Esq., examined by Mr. HOPE SCOTT.

I am secretary of the Imperial Gas Company, and have been so for four years past. The company were originated in the year 1821, and were the third company established—the Chartered being the first, and the City of London the second. Originally our district extended to Chelsea, now occupied by the London and Western Companies. We had also the Commercial district, and that which is marked "Independent" on the map, and it extended northward as far as Tottenham, including all Hornsey. There was no boundary on the north, in fact; the mains ran as far as Edmonton.

The CHAIRMAN: Had you any statutory limit at all?

Witness: There was a limit in the original Act. Northward we had none, but on the south it was bounded by other companies.

Examination resumed: We had competition in the district at an early date by the Commercial—which was then called the British—the London, and the Western. The London Company competed with us in the parish of St. Pancras, in Bloomsbury, and in the parish of St. Andrew, Holborn. The period of the greatest competition was immediately before the year 1857. In that year the companies agreed to divide their districts. Our company was in a condition to supply the whole district under the Act of Parliament, but we were not bound to supply the whole district; we could withdraw at any moment. It was practically by our withdrawal, leaving the smaller companies in possession, that the districting was effected.

Mr. HOPE SCOTT: In your opinion, and as you learn as an officer of the company, do you admit that there is a single duplicate main in your district?

Witness: No; there is not a single duplicate main in our district charged with gas. In one or two cases the original mains of the London Company were left in, but they are not worth taking out. They are completely severed from all connexion with the mains in which the gas is distributed.

Mr. HOPE SCOTT: It is a great inconvenience to open the streets, beside being an expense to the companies; but when the streets are being repaired, or any work being done, you have taken advantage of that opportunity to take up anything you did not want in the ground?

Witness: Yes; we wait until the parish give us notice that they are about to repave the streets, and then embrace the opportunity to take out any superfluous pipes, and to rearrange our own pipes in case of need. But there have been great opportunities of doing this in the Imperial Gas Company's district, especially when the Metropolitan Railway was made throughout the New Road and the Euston Road. The company took up every superfluous main they had, and the thing was thoroughly and completely done.

Mr. HOPE SCOTT: Of this you are sure, that no main, either useless or duplicate, remains in the ground, to which gas has access from your works, at present?

Witness: I feel sure of it. We have a map on which every main that exists in our district is laid down clearly and accurately, therefore it is under my own observation that the present system is complete, and in no way are there duplicate mains remaining to be removed that may be considered superfluous.

Examination continued: The amount of capital actually raised at present is £1,385,250, consisting for the most part of £50 shares. Our loan capital at present is £429,500. I do not know that I can off hand distinguish that portion of our capital which bears one rate of interest, and that portion which bears another rate of interest. It is a very small amount of capital bearing a limit of 7 per cent. Those shares were only issued, or attempted to be issued, late in last year, and there has only been one call due upon them. The amount of our capital bearing 10 per cent. interest is £1,300,000.

By the CHAIRMAN: I see that £85,250 is the amount of our capital at 7 per cent.

Examination resumed: That £85,250 is a portion of the £325,000 which we were authorized to raise last year at 7 per cent. That sum alone has been raised. We have endeavoured to issue a larger quantity of shares than are represented by this paid-up amount, but have not succeeded in floating them.

The CHAIRMAN: Are they preference shares?

Witness: To a limited extent they are made so; in this way, the 7 per cent. shares are to receive 7 per cent. so long as the 10 per cent. shares do not pay a less dividend than 7 per cent.

By the COMMITTEE: They do not range *pari passu* with the 10 per cent. as to dividend. They are ranged equal up to 7 per cent., and the 10 per cent. shares get the 3 per cent. afterwards. The old stock and the new range *pari passu* up to 7 per cent.

Examination continued: Still, with those advantages, we have not been able to float your shares. Those which have been taken, have been taken principally by the shareholders and directors of the company. The directors are very large shareholders, and they have felt bound in the interests of the company to accept all the allotments, but, notwithstanding that, the shares have not gone off. They are £12 10s. shares, with £3 paid on them, and they are selling at 10s. discount.

By the COMMITTEE: The old shares are all paid up.

Examination resumed: I have a table here, showing the amount of our dividends since 1824. In that year we paid 2 per cent. From 1825 to 1841 inclusive, we paid 5 per cent.; from 1841 to 1844 inclusive, 8 per cent.; from 1845 to 1853 inclusive, 9 per cent.; and from 1854 to 1866 inclusive, 10 per cent. We had reached 10 per cent. three years before the districting, which took place in 1857.

By the COMMITTEE: From the year 1821 downwards, taking the first three years as paying no dividend, we averaged just under 8 per cent.

Examination resumed: The first Act of our company which limited the price for gas, prescribed the illuminating power, and limited the dividend, was the Act of 1854. It limited our dividend, by incorporating the Gas-Works Clauses Act with it, to 10 per cent., and it prescribed a minimum illuminating power of 12 wax candles—that is, 10 sperm candles; and it prescribed 6s. per 1000 cubic feet as the maximum price. We were then only making coal gas, with a per centage of cannel. When we commenced, payment was made by burner; but immediately meters came into existence, in 1826, the price was 15s. per 1000 feet. In 1830, the price was 13s 6d.; in 1833, the price was reduced to 12s.; in 1834, it was reduced to 10s.; in 1837, to 9s.; in 1843, to 8s.; in 1845, to 7s.; in 1848, to 6s.; in 1851, to 5s.; in 1852, to 4s. 6d.; and then on the 1st of July, 1865, it was reduced to 4s.

Mr. HOPE SCOTT: What has been the effect of the reduction in price from 4s. 6d. to 4s. as regards your money receipts applicable to dividend?

Witness: The result of the year 1866, the first entire year that we have worked at a reduced price, is that we have been unable to pay our statutory dividends by £7900 in round numbers.

The CHAIRMAN: That is to say, to pay 10 per cent. on £1,300,000 and 7 per cent. on the £85,000?

Witness: Yes; but that 7 per cent. scarcely comes in; it was only a few days on the 7 per cent., because the call did not become due till the 1st of December, and therefore it was 10 per cent. on the £1,300,000.

By the COMMITTEE: Since the Act of 1860 our illuminating power has been raised 2 candles, and is now 12 as the minimum. In fact, we have worked higher than 12-sperm-candle gas. During the past year, for instance, the average, as taken by the testing-officer of Marylebone, makes the highest 15·17 candles, and the lowest 13·57 candles. In the parish of St. Pancras the maximum is 15·06, and the minimum 12·97, or 13 candles. To manufacture this we have used nearly 10 per cent. of cannel.

Examination resumed: Our average rate of interest on the £429,500 borrowed capital, works out to a little over 4¾ per cent.

Mr. HOPE SCOTT: About what are called shareholders debentures in your accounts; a point seems to be made that some capital issued at 5 per cent. —that is to say, authorized to be issued at 5 per cent. by Act of Parliament—was, in fact, issued at 10 per cent. by the company. Will you explain that?

Witness: I ought first to explain that when I answered that the average rate of interest was 4¾ per cent. I excluded from the total of £429,500 the sum of £130,000, which consists of 10 per cent. bonds. In the year 1854, when the company came to Parliament, they showed that £329,000 must have been expended, from time to time, out of the profits, for capital in lieu of raising capital, and they were then authorized to appropriate £13,000 a year as interest upon that capital, and to capitalize it in such a way as they thought fit, either as share or borrowed capital, as forming part of the authorized share capital on the borrowed debt. It was ultimately decided to issue bonds to the extent of £130,000, and to pay that £13,000 a year on those bonds, and that was the course taken in 1854.

Mr. HOPE SCOTT: In fact, the interest was fixed at so much money per annum, and the application of that money was left to the company, whether they allowed 10 per cent. or any other proportion?

Witness: Yes. These bonds are not redeemable by the company, but the holder may sell them.

The CHAIRMAN: The holder may sell them, but the company is not bound to pay the capital off?

Witness: They may come upon the company for the money. They are redeemable by the holder, who may call upon the company to pay him the £100.

The CHAIRMAN: The company cannot require the creditor to redeem them, but the creditor can require the company to pay. Is that it?

Witness: Yes.

Examination resumed: During the last year the company supplied 2,838,701,000 feet—that is, delivered from their works. We put our unaccounted-for gas at just over 16 per cent., including what is used on the works. Our make rather exceeds one-fourth of the entire make of the metropolis. We supply over 60,000 separate houses. I do not think I can tell you how many lights we light at night. Our gross receipts from all sources last year were £587,074. The residual products were £99,984; rental of meters, £8671; sale of old material, £1123; miscellaneous receipts, £358. The gas-rental was £477,037. The gross expenditure was £432,262. The profit for the year was £154,812.

On the witness consulting with counsel and the accountant upon the tables to which he had been referring,

Mr. O'MALLEY at first objected, but afterwards withdrew the objection.

Witness: It was only the peculiar form in which the questions were put that made me pause.

The CHAIRMAN: Do you or do you not think that you have given accurately the total receipts as being £587,074, and the total expenditure £432,262?

Witness: I believe that is so.

The CHAIRMAN: Leaving a balance of profit of £154,812?

Witness: Yes.

Mr. HOPE SCOTT: Now will you give me on the other side all the principal items of your expenditure?

Witness consulted the accountant upon the tables to which he had been referring.

Mr. RICHARDS: The witness has unfortunately dropped a sheet of paper on which he had his calculations.

Witness: Now I will start afresh and give the details of the expenditure, which are as follows:—Cost of coals, £246,560; less products, £99,884, the difference being £146,676; management, £21,308; manufacture, £369,291; less coals, £246,560, the difference being £122,731; distribution, £33,120; law and parliamentary charges, £1834; bad debts, £3263; making the total of those items which comprise all the expenses, except the cost of coal, which has been deducted under the item of manufacture, £282,256. That added to the cost of coals, less the products, which item is £146,676, gives £328,932 as the total expenses of the year. The cost of coal works out to 24·86d. per 1000 feet; the products are 10·07d., leaving 14·79d. as the net cost of coal after deducting residual products. The management works out to 2·15d.; the manufacture to 12·37d.; the distribution to 3·34d.; the law and parliamentary charges to ·19d.; the bad debts to ·33d.; and those summed up amount to 18·38d. To go to the receipts, the gas-rental is £477,037; meter-rental, £3600, less repairs and old metal, £1124; interest, £359; making together, £5083. Those work out as fractions as follows:—Gas-rental works out 48·09d., and miscellaneous items ·5d. per 1000 feet. Total receipts, £482,119; total expenses, £328,932; profit, £153,187. The profit works out to 15·42d. per 1000 cubic feet; the interest on the borrowed money, 2·8d. per 1000.

Mr. HOPE SCOTT: The total of those charges being 30·637d?

Witness (pausing): I am afraid there is something wrong here.

The CHAIRMAN: Would it not be better that all this should be put right by the beginning of to-morrow's sitting?

Mr. HOPE SCOTT: Yes; we will have the table put in correctly.

Examination resumed: The profit works out here to 15·42d. That is not sufficient to pay the interest and dividend. It would require 16·2d. to do that. A difference of 6d. in our gas-rental would be a little over £50,000 a year, taking our present sale of gas. During the past year our rate of increase has been 7 per cent. The year before that it was the same; the year before that 11 per cent. The reduced price of gas commenced in July, 1865, but the increased consumption is rather under the average.

Mr. HOPE SCOTT: Looking back a few years, do you find that successive reductions have been followed by a proportionate increase?

Witness: No; not as a matter of course, at all. For instance, in the year 1848 the company reduced their price from 7s. to 6s. The ordinary rate of increase was about 10 per cent., but the increase in that year was only 5 per cent. In the year 1851 we reduced the price from 6s. to 5s. There was a slight increase, but by no means an unusual one.

The CHAIRMAN: You consider the increase in the sale of gas to be due rather to the occupation of new streets and the opening of new houses than to the fluctuation in the price?

Witness: That is proved to be the case throughout our history.

Examination resumed: We have three manufacturing stations, of nearly the same productive capacity—one at Fulham, one at St. Pancras, and one at Shoreditch—constituting our western, central, and eastern stations. There is an engineer attached to each, and no engineer-in-chief over the whole. They are kept by the directors in a sort of rivalry. The expenses are separated one from the other, with a view of stimulating the engineers, and causing some emulation between them with a view to economy, and they are dealt with according to the results. There is a communication between all the works, so that we can shift the supply from one district to another. But, as a general rule, each station has its own field of supply, and we check all the receipts and all the expenditure referring to that particular station. The directors have a detailed report laid before them every week from each station; therefore they have the means of comparing them with the corresponding week in the previous year. The directors meet at the stations

twice a week, and they have before them every officer employed at that station.

Mr. HOPE SCOTT: Can you suggest, or have you heard suggested by any one, a more regular and economical method of managing gas-works than you pursue?

Witness: I have heard no suggestions that could in any way economize our system, or improve the mode of working with a view to economy, and I have been connected with very large commercial undertakings. I know none so well conducted, or so carefully watched over, and anxiously looked to by the directors and those in command.

Mr. HOPE SCOTT: If any suggestion can be made for your improvement are you quite willing to adopt it?

Witness: There is no improvement suggested that the directors do not test. Every coal that is brought before them with the view of making more gas per ton is carefully examined by their own officers, one against the other, so that the results may be compared; and if any good can be obtained out of it they instantly avail themselves of it. They constantly keep in view the possibility of increasing the profit, and reducing the price of gas.

Examination continued: We are not well placed for the economical conveyance of coal from the ships to the works. We are subject to considerable expense for canal dues and for lighterage. The St. Pancras and Shoreditch stations are on the Regent's Canal, where the dues are heavy and the lighterage dear. Fulham is on the Kensington Canal; that is a shorter length of canal than the Regent's Canal, but it is high up the river, and the navigation impedes us a good deal. We have felt the increased cost of coal, both in cannel and Newcastle, but especially in cannel. We use a variety of Newcastle coal—chiefly the Leverson, the Lambton, and the Peelmain. I think the cost is 15s. per ton.

Mr. HOPE SCOTT: That is what Mr. Clift takes at 13s. 3d.

Witness: Yes. In addition to that we have to convey it to our works, which costs us 1s. 6d. to 1s. 9d. per ton, in addition to the 15s. Cannel has risen since January, 1865, about 13 per cent., and Newcastle from 9d. to 1s. per ton during the half year. The residual products have not kept pace with the coal. We have also felt the rise in wages, which have gone up from 4s. to 4s. 6d. for stokers, and there has been generally a rise in wages throughout the whole establishment. The engineer will speak more particularly to that point than I can. The rate of wages is still rather on the increase than decrease. The capital of the company works out to £6 1s. 4d. per ton of coal carbonized.

Mr. HOPE SCOTT: We have it that the average of all the London companies is £6 5s.—that is given by Dr. Frankland?

Witness: Yes.

Mr. HOPE SCOTT: What do you work it out at?

Witness: I have not got that.

Examination continued: We have lately constructed some large additional works. I have, on the basis of these, calculated what it would cost to supply the whole of our present works as they now stand. That calculation is based on the prices actually quoted to me for the works we are doing.

Mr. O'MALLEY: We should like to know what those works are.

Witness: We have erected works at Fulham and Shoreditch. We find that we could not construct works along our whole system at a less figure than our capital—not at less than £6 1s. 4d. per ton; that is inclusive of the land. The Act of 1860 did not, so far as we are concerned, incorporate the Gas Clauses Act for the first time; our Act of 1854 did that. Previously to 1860 we were, under the Act of 1847, unrestricted with regard to back dividends. The Act of 1860 restricted us to six years. The total sum which, in the year 1860, supposing we had money enough by the sale of our gas, would have recouped our shareholders in the way of back dividends under the Act of 1847 would have amounted to £600,000. The Act of 1860 prevented our paying it. The Imperial district, as I have described it, comprises both the urban and suburban supply; and the difference in return is, of course, considerable between the suburban as compared with the urban district for a mile of main. We charge the same price throughout the district. We have endeavoured to increase our works, and to place them in situations which would be unobjectionable, as we thought, and we have been denied these powers by Parliament. In 1865 our capital was exhausted, and we made an application to Parliament to raise more capital, and to build additional works in Hackney Marshes. That bill passed the House of Commons, but was rejected in the House of Lords on the second reading, because, besides our new works in Hackney Marshes, we proposed some enlargement of the works at Fulham, to which objection was made by the Bishop of London. In 1866, we renewed our application to Parliament omitting the enlargement of the works at Fulham, and that bill was first taken in the House of Lords, and was passed by that House. Then the House of Commons threw out the bill on the second reading, because in that case the site selected in Hackney Marshes was too near to Victoria Park, although it was the same site which the House of Commons had passed the previous year. Up to this time we have not enlarged the works at Fulham, or provided new ones in Hackney Marshes. All we have obtained from Parliament has been power to raise £325,000 at 7 per cent., and that was under a supplemental bill brought in in 1866, which capital we have not been able to float beyond the small amount I have mentioned. The extent of our mains is 600 miles, and our rental amounts to £776 per mile. I cannot say what proportion that bears to the receipts of other companies per mile, but it must be very small as compared with many of them.

By the COMMITTEE: Our receipts are below the average, in consequence of the suburban districts.

Cross-examined by Mr. O'MALLEY: Before 1857 our districts embraced those of the Western, a part of the London, the Independent, and a part of the Commercial. I do not know which of those companies was first in the field. When we started, in 1821, there was some competition between us and the Chartered Company. I think not with the City Company. When the districting took place the London Company was the chief company we were in competition with, but we also competed with the Independent and the Western. I presume the districting would not have been effected if it were not considered for their interest, and also for the interest of the public at the same time. We paid 10 per cent. dividend from 1854. When we arranged the districts it was effected on our parts by abandoning a considerable portion of our district. I believe it was a district in active operation at that time.

Mr. O'MALLEY: Were you, in the district of the Western Company, in active operation then?

Witness: I am scarcely able to say; I was not there at the time.

Mr. O'MALLEY: You cannot tell me, then, whether you were in active operation in those abandoned districts, that you were actually occupying with your works?

Witness: I cannot; not for the supply of gas.

Cross-examination continued: In the parish of St. Pancras, the London Company were competing with us, and they receded from there. That is a very large parish. They also receded from Bloomsbury. We both had our mains down in those parishes. The useless mains have been gradually taken up, or applied so as to make them useful. There are very few left in the ground.

Mr. O'MALLEY: I need scarcely ask you whether, after the evidence we have heard from some of the witnesses, they are hardly worth removing, for whether removed, or left waste, or sold for other purposes, there must be a very large loss upon the original outlay?

Witness: Of course there must be, if two mains are laid where only one is wanted.

Mr. O'MALLEY: If they have to take up a main that has been laid down, and has been in use for several years, is it not a fact that there must be a very large loss upon the original outlay on those mains?

Witness: I should doubt it.

Mr. O'MALLEY: Just understand me. Suppose you lay down a main in a street, you have, of course, the labour of laying it down?

Witness: Yes.

Mr. O'MALLEY: Suppose you have done this for several years, and then you have to dig up, and dispose of it; do you mean to say that you can dispose of it for as much as will pay the original cost and the double labour?

Witness: Of course not.

Mr. O'MALLEY: If not, there must be a loss, and an immense loss.

Witness: I think that the total amount has been exaggerated. I cannot say if it would be as much as 75 per cent. It appears plain that, if two mains are laid down instead of one, there must be some loss in taking them up and selling the old materials.

(*To be continued.*)

Legal Intelligence.

COURT OF BANKRUPTCY.

THURSDAY, JUNE 13, 1867.

(*Before Mr. Commissioner* HOLROYD.)

Re TOM ABERCROMBIE HEDLEY.

This was an adjourned meeting for final examination and discharge. Mr. BAGLEY appeared for the bankrupt, Mr. REED for the assignees, and Mr. WALLINGTON for the Leamington Local Board of Health.

Mr. REED: In this matter, sir, of Hedley, the case was adjourned on the last occasion, inasmuch as the bankrupt declined then to answer certain questions that were proposed to him on behalf of the assignees. Those questions, sir, had reference to a quantity of furniture that had been disposed of by means of a raffle just before the bankruptcy, and the point was this:—After being examined with regard to other property, he was asked whether any of his furniture had been raffled for either just before or since his bankruptcy. The bankrupt refused to answer the question, and the examination was adjourned *sine die*. I will now examine him, if you please, with regard to that property. We are not at all satisfied with this.

The COMMISSIONER: You had better read his statement first.

Mr. REED: This is the statement he has put on the proceedings:—

In Re TOM ABERCROMBIE HEDLEY.

Statement as to Property.

In 1865, more than six months previous to my bankruptcy, being in want of money, I pledged a gold watch at the shop of Mr. S. W. Harding, of 207, High Holborn, and a gold chain at Mr. Blizard's, Harrow Road; £14 was advanced upon them, being, as I was informed, their value.

At the time of my bankruptcy, my wife was in possession of a china flask, that had been the property of her deceased father; three drawing-room table books on the Exhibition of 1862; and a small painting done by a personal friend of ours; and these things she claimed as her personal property, out of the bill of sale when enforced.

Being in want of money for the support of herself and children, she tried to dispose of these things, but could not, but at last was able to get £6 advanced on the books through the kindness of Mr. Rea.

In April last, upon my wife consulting some friends as to providing means for the subsistence of herself and children, it was suggested that there were many friends who would subscribe to a raffle, if promoted for this purpose; and to carry this out, Mr. Rea agreed to act as secretary, and Mr. J. T. Olney as treasurer to receive the money for Mrs. Hedley. A prospectus was prepared by Mr. Rea, as attractive as possible, and forwarded as it was thought, only to friends. Eighty one tickets were applied for, and with the money thus obtained the watch, chain, and books were redeemed, the expenses paid, and the balance handed to Mrs. Hedley. The tickets were for one guinea each. The articles raffled for were a gold watch, a gold chain, a china flask, three volumes of books, and a small picture.

(Signed) TOM ABERCROMBIE HEDLEY.

May 29, 1867.

You see, sir, there is no mention here of furniture at all—not an item. What we were talking about on the last occasion, at least as far as I understood it, was furniture that had been the bankrupt's property that had been disposed of by him just immediately before the bankruptcy—or not disposed of, but disposed of as he alleged—and which had been sold by him after the bankruptcy.

Bankrupt: It was a misapprehension, Mr. Reed.

Mr. REED: It may have been a misapprehension of yours; I do not think there was any misunderstanding of the question, or any misapprehension of the fact, on the last occasion. The examination then turned solely and wholly on the fact that the furniture of the bankrupt had been sold. This statement does not apply to that at all. If there has been any blunder it has been on the part of the bankrupt.

The COMMISSIONER: What was alleged was that there had been a disposal of certain furniture, or of certain goods or effects, on the part of the bankrupt by a raffle. He has shown you that what are here mentioned comprise all the articles that were disposed of by the raffle.

Mr. REED: On the last occasion, sir, beyond all doubt, the bankrupt stated the value of the property to be £150.

Bankrupt: No, Mr. Reed; I said that the party who got up the prospectus did it as attractively as he could, and he stated in the prospectus that the things had cost £150. The watch, for instance, which cost me £6, cost originally far more than that. It cost £105. It was made for a brother-in-law of mine many years ago, and cost me £6 when he died. It was put down in the prospectus as having cost £165; but I could not have got £10 for it if I had sold it.

Mr. REED: You see, sir, the assignees have been getting information. As far as this has been published, we have nothing to do with it, except that we found it in print, in a convenient form to refer to what took place on a former occasion. It is not pretended that the assignees had anything to do with publishing it. There may be ingredients in the case between the bankrupt and other parties which have excited a good deal of animosity between them; but our object is simply to ascertain if there be property undisclosed, and if there be, that it should be fairly stated on the proceedings. If you think, sir, that this a fair account——

The COMMISSIONER: He swears to it as being a correct one. He says it

contains all the property that was actually disposed of by the raffle, and that no property has been disposed of in any other way.

Mr. REED: I will put it to him. (To the bankrupt:) Is this the property you referred to on the last occasion as property that had been disposed of by you after your bankruptcy?

Bankrupt: It is.

Mr. REED: Does this account comprise every item that was so sold?

Bankrupt: It does. I have a printed copy here. "First prize, a gold repeater; second prize, a chain." Five prizes are named.

Mr. REED: You have compared the list of articles mentioned in this account with the articles that have been sold or disposed of, and this enumerates every one of them?

Bankrupt: It does. The prospectus was in print, and therefore there can be no doubt about it.

Mr. REED: Did you receive the whole £81 or guineas?

Bankrupt: No; I received none of it.

Mr. REED: Who did then?

Bankrupt: As the statement there states, the parties who got up the raffle paid first the money to get the things out of pledge, the cost of the interest, the printing and the getting up of the raffle, handed to my wife the balance, and took her receipt, not mine. They would not acknowledge me in the matter.

Mr. REED: I do not think you have put in the accounts any statement with regard to these articles that were pawned.

Bankrupt: This only took place last March, and my accounts were filed in May last year.

Mr. REED: When did your bankruptcy occur?

Bankrupt: In May, 1866; thirteen months ago.

Mr. REED: At that time had you these goods that were subsequently pawned?

Bankrupt: If you read the statement you will find that they were pawned more than six months prior to that.

Mr. EDWARDS (official assignee): If you look at the commencement of the statement you will see that he says he received £14 on them.

Bankrupt: I had not the property; I had the tickets.

Mr. REED: When you filed your accounts, you made no mention of this property so pawned?

Bankrupt: I did not.

Mr. REED: You had at that period, in your pocket, the tickets by which the property was subsequently redeemed?

Bankrupt: They were of no value. I could not get any one to pay the interest on them.

The COMMISSIONER: You should have mentioned this.

Bankrupt: I was not aware, your honour, that I ought to have done so, or I would.

Mr. REED: This property was subsequently redeemed by your friends and disposed of for £81?

Bankrupt: No; they were raffled for when they were in pledge, and the money that was got from the raffle redeemed them.

Mr. REED: Do you know how much balance was actually paid over?

Bankrupt: I think Mrs. Hedley received something like £50 odd. It has been nearly all she has had to keep the three children and myself.

Mr. REED: Were there any other persons engaged in the raffle except those gentlemen whose names are mentioned here?

Bankrupt: No, not engaged in getting it up. The prospectus was printed. Mrs. Hedley's name appeared on it. There was no secrecy about it; it was all done in print.

Mr. REED: That is all I propose asking, sir, with regard to these accounts. The pledges that are mentioned here ought certainly to have been stated in the accounts, and the tickets given up to the assignees, if the property did, as the bankrupt now states, cost £150.

Bankrupt: £105.

Mr. REED: I will take it at £105.

Bankrupt: The watch, something like 20 or 25 years ago, cost my brother-in-law a hundred guineas. When he died I got it for £6. Therefore, as far as I was concerned, the value of the watch was £6. But, of course, my friends, or my wife's friends, in raffling it, wanted to make the best they could of it, and put it down at its original cost.

Mr. REED: I am quite content to assume that these gentlemen did put an attractive value on the property—viz., £150; and I am willing to deal with the question on the real value of the property, which the bankrupt now says is £105.

Bankrupt: No; the watch cost that 25 years ago. The real value was £6. I gave £6 for it. That was the one that cost £105.

Mr. REED: Really, sir, I do not think that the question as to whether it was worth £106, or £90, or £80, is one of great importance. The only thing I am looking at is the principle of the bankruptcy in bankruptcy. The debtor had not the property in his possession when he filed his petition; the property was omitted from the accounts altogether. Subsequently to the bankruptcy, either by himself or through his friends, he made use of the property, and it then realized what I am quite willing to suppose is an extreme value of about £85, at a guinea each member. Suppose the property was worth half the amount, £40, inasmuch as it had only been pledged for a very small sum; indeed, it is quite clear there was a large margin of value, a tangible and substantial one that could be dealt with. Now, I apprehend that when a man comes to pass his last examination, he only passes it on the assumption that the accounts filed by him are correct. In the present case, up to this hour, the accounts are wrong as to the surplus or advantage that was to be obtained from the redemption of this property. That is an advantage which at this instant belongs to the estate, and of which no act of the bankrupt or of his friends can deprive the creditors. The only point of view in which the assignees look at it is, what is to be done? The bankrupt has had the property; he has had the advantage of it—more than the advantage of it; but what is to be done with regard to the estate? Is the court to pass over the fact of the omission of this property, which is nothing less than concealment, rightly or wrongly, and commend it? or, on the other hand, to direct that the bankrupt shall pass his last examination when he has paid its value into court?

The COMMISSIONER: Certainly the court would not pass over the fact, and thereby commend it; and it has not been passed over. The bankruptcy has been in existence for the last twelve months, and the bankrupt has appeared on various occasions. On the last occasion he acted certainly very injudiciously to himself, and very contrary to the policy and intention of the bankrupt law; and if he had passed his last examination at that period, with all this matter not divulged, he probably might have subjected himself to an indictment for misdemeanour. He has now, however, fortunately disclosed what he states to be the truth with regard to the property that had been pledged, and his statement becomes part of the statement of accounts; and therefore, taking it in connexion with the previous accounts, it appears that he has now on oath divulged and given a true statement of all his property. With respect to the wife getting the proceeds of it, that stands in rather peculiar circumstances, seeing that a portion of this property was in pledge, so far as I can gather from the bankrupt's statement, up to the time of the bankruptcy, he ought of course to have given up the duplicates, and mentioned the circumstances; but instead of that, he allowed the occasion to pass without communicating them to the assignees. Subsequently some friends, with the view of getting some advantage for the wife, got up a raffle, and ultimately the bankrupt's family has had the benefit of the proceeds of this property which was pledged. Of course the assignees could not have the property without redeeming it, paying what was advanced upon it; and the circumstances of its having been used by the wife after the bankruptcy would only bring it to this, that the court should determine whether in point of fact there has been more than should fairly have been expended for the support of the family during the period that has elapsed since the bankruptcy. I should think probably there would not be. Perhaps (addressing the bankrupt) you have now been made aware, through your legal adviser, that you acted very improperly on the last occasion?

Bankrupt: I am sorry, sir.

Mr. BAGLEY: It was from an absurd notion of delicacy towards those who had been charitably engaged.

The COMMISSIONER; A bankrupt puts himself in great jeopardy if he passes his last examination without giving up all his property. He is liable to an indictment for misdemeanour. You (addressing the bankrupt) have now had an opportunity to consider, and you have now given what you swear to be a true statement; therefore, under all the circumstances, I think you should be allowed to pass your last examination.

Mr. REED: I do not know, sir, what course is intended to be taken. There is a gentleman here who, I am told, has a strong opposition to the order of discharge.

Mr. BAGLEY: I am quite ready to go into it.

Mr. REED: The assignees also oppose the order of discharge.

Mr. BAGLEY: By all means let us know what it is.

The COMMISSIONER: On what grounds?

Mr. REED: On what grounds the assignees oppose the order of discharge?

The COMMISSIONER: I want to know generally the grounds.

Mr. REED: That the bankrupt's insolvency is attributable to unjustifiable extravagance in living, and that he has been contracting debts without having a reasonable expectation of being able to pay. Those are the two grounds, sir. I will put them before you very shortly. You will see that the debts involve two different accounts—an account of separate debts, and an account of joint partnership debts. The partnership was one that existed only for a very limited period. Those debts are a sum of £900, and the separate debts of the bankrupt amount to a sum of £1157. The returned income of the bankrupt is a very small one; his expenses, however, for living and personal expenses amounted, I believe, to about £800 a year, and there seemed to be no fund or proceeds out of which those expenses should be paid, excepting by incurring a large amount of debt and coming here for the object and purpose of paying the creditors by bankruptcy. Those, sir, are assets which have been providentially discovered by the assignee. If you look at the accounts filed by the bankrupt they disclose no assets whatever excepting these:—"Good debts over £10," all carried out blank. There was not a farthing of assets disclosed in the private accounts filed by the bankrupt; and with regard to the partnership accounts, the assets there disclosed are what he calls "good partnership debts, £180," and "doubtful partnership debts, £412;" but with regard to these, I think I am correct in saying that they have realized little or nothing. That is, I am told, the source from which the £80, after a great deal of difficulty, has been derived. If you look underneath the statement of private accounts of the bankrupt, you will find that he there sets down his own private expenditure at £800 per annum. He says, "My expenses have been £800 per annum." Now, what there was to justify this extravagant mode of living per annum, with really very little or no income, I am at a loss to understand. At present I have heard no justification of this large expenditure. That the bankrupt was in very straitened circumstances is quite clear, from the fact that he has just discovered—viz., that so far back as 1865 he was compelled to resort to the very desperate mode of raising money by pawning his jewelry, his watch, and other articles of adornment. The amount, too, raised by these pledges was very small, and thereby showed clearly that so far back as June, 1865, he must have been in very straitened and impoverished circumstances. The pawnings do not seem to have been confined either to one article, but to have extended over different little articles, which are enumerated in the account that he has filed of the property that was subsequently redeemed, and show not only on one day, or in one week, but that at different times he was involved in very pressing difficulties. Now, sir, if a man has been spending £800 a year on himself and his family, one naturally asks what justification was there for doing so? We see here a lot of little debts which ought not to appear upon a man's accounts, and which certainly would not have appeared unless he had been in very difficult circumstances so as to prevent his making payment. There is a gas engineer with a large debt which might have had something to do with the bankrupt's engineering speculations, £75; there is a brewer for £10, a stationer for £2 1s. 6d., a picture-frame maker for £5, a cheesemonger for £30, a Mr. Cooper, "cash lent," £10, a gas-meter maker. This was with reference to an interest which the bankrupt had in some gas factory, and which seems to have been liable to be determined at any moment at the pleasure of some third party. Then, sir, there is £123 to an attorney for law costs; another gas-meter maker and engineer £50, the gardener £4, the carpenter £2. There are, extending through the accounts, a great number of very small debts owing to different people, who have from time been supplying goods to the bankrupt's house, and I believe, sir, these extend not only over the year immediately preceding the bankruptcy, but as far back as the year 1862, and from thence they have run continuously up to the year 1866, at the date of the bankruptcy, clearly showing that from time to time, many years back, the bankrupt was unable to pay his way at all, and that he was compelled to leave undischarged those trifling debts due to the brewer, and the baker, and the grocer, which any man in ordinary circumstances, and with only a very moderate income, always makes it a point, not only of duty, but of honour, to discharge. Of course, sir, there are always, in any neighbourhood, people who are ready to give credit; and as the bankrupt was living ostensibly as a man of some means, at the rate as he tells us of £800 per annum, it is not to be wondered at that little tradesmen should be ready from time to time to give him credit. It seems to my mind very much to be lamented that the bankrupt should have accepted their credit, and left the means of payment only that which is to be obtained through the intervention of this court. But, sir, it is more upon the face of the accounts as they stand than upon what the bankrupt has stated himself, that the assignee raises this portion of the opposition, that there never was a justification for his living at the rate of £800 per annum. All these debts are unnecessary extravagances. If a man is only earning £100 a year, he ought to be careful and cautious to contrive his expenditure to bring it

within the limit of his income; and, as the bankrupt must have known from year to year that he was getting further backward, there ought to have been more impressed upon his mind the necessity of, if possible, curtailing his expenses. But the expenditure of £800 per annum seems to have continued, and the result is the eventual bankruptcy. With regard, sir, to the other point that is suggested to the court, that the bankrupt has been contracting these debts without a reasonable expectation of payment, one point seems really to be involved within the other. If the insolvency is attributable to reckless extravagance, all these debts must have been contracted with little or no expectation of being able to pay them. In fact, I do not know that we have heard, throughout the case, that there was any pretence of an expectation of being able to pay. What we have understood is, that the bankrupt has got into debt, and now comes to this court to clear himself of his difficulty. He seems to have had no income out of which they should have been paid. There seems to have been a tendency on the part of the bankrupt, which has existed for years, to involve himself in very dreadful litigation. Actions have been brought by him in various directions; in some he has been successful, in most he has been defeated, and the result is that a great number of his difficulties are attributable to that one sole and single cause; but, with regard to any expectation on the part of the bankrupt to pay £1100 worth of private debts and £900 of partnership debts, there does not seem to have been the shadow of a pretence of justification for having incurred them, even if the most favourable turn had occurred in his affairs. All that has been realized of this amount of debts is about £40; perhaps there will be just enough to pay the costs of the bankruptcy, and to leave something to the unclaimed dividend-fund, for probably there will not be enough to divide anything in the shape of dividend amongst the whole body of creditors. It is upon this view of the case, and this view only, that the assignee feels, as the representative of this estate, that he is bound to bring this matter before the court, and that he would not be discharging his duty if he were to allow the bankrupt to pass with these facts and figures staring him in the face, showing the little justification which the bankrupt can give for incurring a very large amount of responsibility, which there was really nothing whatever to meet. Upon that ground, sir, the assignee asks that your judgment may be adverse to the bankrupt.

Mr. WALLINGTON: I appear here, sir, as representing the claim of the Local Board of Health for the district of Leamington for a sum of £160 odd, the amount of costs incurred by the board in consequence of an action which was brought by the bankrupt against the Board of Health; and although it may be said that I have some personal antagonistic feeling to the bankrupt, for which there may or may not be cause, still I am sure your honour will not listen for a moment to any suggestion that my views or feelings would have any operation or effect upon a public body like the governing body of the town of Leamington. I am sure your honour will not attribute to them any motives but the purest and best—viz., an endeavour to do their duty towards the ratepayers of Leamington. It is quite true, and I do not disguise the fact, that there have been proceedings, and very extraordinary proceedings; but those proceedings have resulted entirely in my favour, and from the very first onset to the last there has been but one vindication of my conduct. I have, therefore, nothing to say upon that subject; I appear before you simply as the representative of the board of Leamington, and in that position, and in that only, do I attempt for a moment to offer any observations on this case. Your honour will understand that I know, perhaps, more of the circumstances attending this bankruptcy than any other individual can do, because my clients, the Board of Health, have been subjected to very considerable litigation at the instance of the bankrupt, which has resulted in a very heavy loss to them. The consequence is that I know the *pros* and *cons* of this case, perhaps, better, and can give your honour more information on that subject, than any other individual could, perhaps, have done. Now, I beg to call your honour's attention to the fact——

Mr. BAGLEY: If you are going to make any statements of fact will you be good enough to go into the witness-box, and let us have the statement on oath? We cannot mix the advocate and the witness together.

Mr. WALLINGTON: If your honour would prefer it, I will examine the bankrupt in support of my statement, which will follow.

The COMMISSIONER: I only want to know the grounds of your objection.

Mr. WALLINGTON: The grounds of my objection are—the fraudulent preference of creditors, the trader not keeping any accounts (and I can prove the bankrupt to be a trader, to all intents and purposes; there is not one single account kept; on the contrary, he admits, on the face of the balance-sheet, that he has not kept a single tittle of accounts, although he has been carrying on business to a very considerable extent), and incurring debts without the possibility of payment; and incurring debts, as I shall be able to show your honour, under the most objectionable and adverse principles—incurring debts that people could not possibly evade or avoid. Actions were brought against my clients, and against other persons, and the debts that were incurred were incurred in defending those frivolous proceedings; and, therefore, it is under the worst aspect that those debts have been incurred; and I propose to confine my objections to those three heads I have mentioned. I have some questions to put to the bankrupt, and if your honour thinks I had better examine him before I make my statement to your honour I will do so.

The COMMISSIONER: I suppose we have already heard your statement; we do not want that from you again.

Mr. WALLINGTON: Your honour has not heard the reasons for the objections I have stated. Your honour cannot be aware of the facts and circumstances.

The COMMISSIONER: They must be matter of evidence. You must prove the facts.

Mr. WALLINGTON: Very well, your honour.

The COMMISSIONER: I ought to tell you that fraudulent preference is not an offence under the present Act of Parliament.

Mr. WALLINGTON: I was aware of that, your honour; but I considered it would be a matter that your honour would take into consideration amongst the various other circumstances I should have to state to you. That leaves me, however, with two objections—that the trader has kept no accounts whatever (that is upon the face of the proceedings), and that he has incurred debts without the possibility of paying them. I shall venture to draw attention to the mode in which the bankrupt has conducted himself with reference to the incurring these debts, and the position in which he has placed himself; and I will do so without taking up any unnecessary time of your honour by very shortly stating——

The COMMISSIONER: That I would rather have by evidence, I think.

Mr. WALLINGTON: Very well. (To the bankrupt:) In the year 1864, Mr. Hedley, did you give a bill of sale to your solicitor, Mr. Tibbitts?

Bankrupt: Yes, in the early part of 1864, I think.

Mr. WALLINGTON: What was the amount of that bill of sale?

Bankrupt: I have already stated that it was either £200 or £230. I am not certain which.

Mr. WALLINGTON: You say you have already stated. Will you be kind enough to answer my questions? What interest were you to pay for that?

Bankrupt: Twenty per cent.

Mr. WALLINGTON: And that was registered under the Bills of Sale Act in 1864?

Bankrupt: I presume so.

Mr. WALLINGTON: You having registered that bill of sale in favour of your solicitor?

Mr. BAGLEY: He did not say he registered it.

Mr. WALLINGTON: Then the bill of sale having been registered in favour of your solicitor, which is precisely the same thing, did you commence an action against a Mr. Dethick some months afterwards?

Bankrupt: Some long time afterwards.

Mr. WALLINGTON: Was that tried in the Court of Exchequer?

Bankrupt: It was.

Mr. WALLINGTON: Before a special jury?

Bankrupt: It was.

Mr. WALLINGTON: Did you succeed in that action?

Bankrupt: I did not; I ought never to have brought it. I was a fool for bringing it.

Mr. WALLINGTON: You did not succeed?

Bankrupt: I did not.

Mr. WALLINGTON: And you had to pay the costs?

Bankrupt: I had. My claim was £50 odd, and I paid £78 odd taxed costs on the other side.

Mr. WALLINGTON: Did you bring an action against the corporation of Dublin?

Bankrupt: Yes, which you helped me to lose.

Mr. WALLINGTON: How did you fare there?

Bankrupt: By the conjunction of yourself and the solicitor in Dublin you agreed to ruin me, and I lost the cause.

Mr. BAGLEY: You had better confine yourself to answering the gentleman's questions.

Bankrupt: I lost the action, and £150 in costs, I think, as well.

Mr. WALLINGTON: Did you pay those costs?

Bankrupt: I did, every halfpenny.

Mr. WALLINGTON: Was there any execution taken out?

Bankrupt: There was not.

Mr. WALLINGTON: Then did you commence proceedings against the Board of Health for the town of Leamington?

Bankrupt: After writing some ten letters, to which I could get no reply, I did commence an action against them.

Mr. WALLINGTON: Was that referred at your own instance to one of the masters in the Exchequer?

Bankrupt: I offered to refer it to counsel.

Mr. WALLINGTON: Was it referred at your own instance to one of the Masters of the Exchequer?

Bankrupt: It was.

Mr. WALLINGTON: What was the result of that action?

Bankrupt: You paid £40 into court. I lost the case, and the taxed costs were about £200; and rather than pay that £200 (I could pay everybody else) I came into this court.

Mr. WALLINGTON: You said you went into partnership with Mr. Rea. Who was Mr. Rae?

Bankrupt: I can simply say Mr. Rea. I don't know who Mr. Rae was.

Mr. WALLINGTON: What was he?

Bankrupt: He was a gentleman, and at the time I knew him was secretary to the Thames Plate Glass Company, Limited.

Mr. WALLINGTON: Did he enter your service in the first instance as clerk?

Bankrupt: He was never in my employment as clerk.

Mr. WALLINGTON: You say that he was a secretary. Have you previously stated that he was an accountant?

Bankrupt: I do not understand your question.

Mr. WALLINGTON: Have you previously in this court stated that Mr. Rae was an accountant?

Bankrupt: Mr. Rae was an accountant—secretary and accountant to a company.

Mr. WALLINGTON: When did your partnership commence?

Bankrupt: It would be in 1865.

Mr. WALLINGTON: Then I understand you to swear that he never was in your service in any shape, and was simply a partner?

Bankrupt: He was never in my employment as clerk.

Mr. WALLINGTON: Did he never write any letters for you?

Bankrupt: He did while he was the secretary of the Thames Plate Glass Company. He was then in negotiation for the partnership, and interfered in the business. He made out all the accounts I used to make out to the different companies and local boards, but not as clerk.

Mr. WALLINGTON: You were contractor for the supply of gas, I believe, to different companies?

Bankrupt: I was.

Mr. WALLINGTON: Amongst others, you were contractor for the town of Uxbridge?

Bankrupt: I was.

Mr. WALLINGTON: Did you supply the gas to the company at Uxbridge?

Bankrupt: To the gas company.

Mr. WALLINGTON: And you had the whole charge of the manufactory?

Bankrupt: I had.

Mr. WALLINGTON: You provided the coal, and everything that was requisite.

Bankrupt: Well, I was the contractor.

Mr. WALLINGTON: Were you a contractor for the company in the month of April, 1866?

Bankrupt: No; I was the acting agent for the contractors, so that if any one were speaking to me I should call myself so.

Mr. WALLINGTON: I believe, your honour, I am in order in calling the bankrupt's attention to this document, which is, I believe, evidence in all courts.

Mr. BAGLEY: What is that?

Mr. WALLINGTON: It is a Blue-Book containing the transcript of evidence taken before committees of the House of Commons, and published by order of the House of Commons.

Mr. BAGLEY: I am not at all aware that it is evidence in any court.

The COMMISSIONER: I do not know what it has to do with this case.

Mr. WALLINGTON: It has this much to do with the case, your honour, that it is directly opposite to the bankrupt's statement.

The COMMISSIONER: You may refresh his memory with that.

Mr. WALLINGTON: Do you recollect giving evidence on the City of London Corporation Gas Bill?

Bankrupt: I do.

Mr. WALLINGTON: Was that in the month of April, 1866?

Bankrupt: It was.

Mr. WALLINGTON: Do you recollect this question being put to you—"Are you the contractor for the supply of gas to a great number of companies?" "I am contractor for the supply of gas to Uxbridge, and I am the lessee of some smaller works at Wallingford and Southam. I manufacture and supply gas to the consumer."

Bankrupt: That is not my answer to the question. I never made that statement. The last answer you have given is not mine, because I supply the company, not the consumer. You have just stated that I supply the consumer. It is merely the error they very often make of putting the consumer instead of the company.

Bankrupt was asked respecting the correctness of some further evidence before the committee, wherein he stated that he farmed the Uxbridge works and found the coal and labour.

The COMMISSIONER: We cannot go into all this in support of your objection. You should confine yourself to showing that the bankrupt incurred debt without reasonable expectation of payment.

Mr. WALLINGTON: I am giving this to your honour to prove that the bankrupt was a trader within the meaning of the Act, and that, being a trader, he kept no accounts. (To the bankrupt:) What became of your contract with the Uxbridge works at the time of your bankruptcy?

Bankrupt: I had no contract with the Uxbridge works at the time of my bankruptcy.

Mr. WALLINGTON: When did that terminate?

Bankrupt: In the early part of 1864.

Mr. WALLINGTON: How came that to terminate?

Bankrupt: By some friends, who were returned in my accounts, becoming security for the payment of £500.

Mr. WALLINGTON: Who were those friends?

Bankrupt: Two gentlemen named Tatham and Rye; and the contract was then turned from my name into theirs, for them to hold as security for the money; but, so long as I was solvent, I was to be the agent and acting man for the company; so that, to all intents and purposes, I was acting man for the company. These gentlemen never interfered except in receiving the money from the company, and handing it over to me. The original contract contained a clause that on the day of my bankruptcy it should cease.

Mr. WALLINGTON: Who were Mr. Tatham and Mr. Rye?

Bankrupt: Mr. Rye has been my medical man, living in the country, for the last 12 years. Mr. Tatham is a friend of my wife, living at Paddington.

Mr. WALLINGTON: And those parties, upon your bankruptcy, took all the assets with reference to the Uxbridge works?

Bankrupt: They did.

Mr. WALLINGTON: Has the bill of sale to Tibbitts been brought into this court?

Bankrupt: There has been a private meeting held about it. I volunteered every information. I know nothing more than that.

Mr. WALLINGTON: Has it been brought into court?

Bankrupt: Not that I know of. I volunteered every information and every assistance.

Mr. WALLINGTON: Has the deed of co-partnership with Mr. Rea, your partner, been brought into this court?

Bankrupt: Not that I know of.

Mr. WALLINGTON: Has the security to Messrs. Tatham and Rye, with reference to the Uxbridge works, been brought into this court?

Bankrupt: There was no security given to them. The lease, I tell you, was a new contract made direct between the gas company and themselves, and mine was cancelled.

Mr. WALLINGTON: When was it cancelled?

Bankrupt: In the early part of 1864, at the time they became security for the payment of the £500.

Mr. WALLINGTON: And you have previously told me that in the year 1866 you swore you were the contractor of these works.

Bankrupt: I stated at the same time that I considered myself as contractor.

The COMMISSIONER: There was a long examination into all these matters. This could all have been done at once.

Mr. WALLINGTON: But I believe, unfortunately, it was not taken down. (To the bankrupt:) Then you were contractor of these works, and never kept an account?

Bankrupt: I beg your pardon. The accounts were kept by the foreman or the manager to the gas-works, who kept as beautiful and correct accounts as could be kept, and they are in their possession as their accounts.

Mr. WALLINGTON: You were contractor of other works where the accounts were kept in the same manner?

Bankrupt: They were always kept at the works.

Mr. WALLINGTON: There are no accounts given in your bankruptcy of any of these works.

Bankrupt: I had no account to give them, for the contracts ceased on the day of my bankruptcy.

The COMMISSIONER: I think the only question that calls for an answer is as to the debts contracted by the bankrupt in 1865 and 1866.

Mr. BAGLEY: In the year 1865 were you earning a very large amount of money?

Bankrupt: I was. My estimated income—that is, the accounts I sent out for professional services and the money I received from contracts—wa as nearly £2000 as possible.

Mr. BAGLEY: Have you an account of that?

Bankrupt: I have a diary in which I entered each account as I sent it in.

Mr. BAGLEY: It so happened that the money did not all come in as you expected?

Bankrupt: No; through the opposition of Mr. Wallington I lost—at least, I have not got in—£400 or £500 short of the £2000, but I did receive £1500.

The COMMISSIONER: Do you mean money owing to you?

Bankrupt: I received in 1866 nearly £1500, and there is one company that now owes me upwards of £400, and the corporation of London owes me £100 or £200, or they owed me something, and £87 10s. was paid into court.

Mr. BAGLEY: Besides that you contracted a partnership with Mr. Rea.

Bankrupt: That was in 1865. Mr. Rea's solicitor handed me over £700 for the share of the partnership, and he satisfied himself that my income was £2000, or he would not have given that money.

Mr. BAGLEY: Yours is a business that requires great outlay?

Bankrupt: It is; it is all outgoing. I was obliged to be at Dublin and Leamington, and other places, and I was short of money, and was only enabled to go out of town by raising it in the way I did.

The COMMISSIONER: How did you expect to be reimbursed, so as to enable you to pay your debts?

Bankrupt: At the time of my bankruptcy I had no claim whatever upon me for money. The money that was owing to me at the time of my bankruptcy, irrespective of the law-costs of Leamington, were quite sufficient to have paid every debt that I owed. You will find, if you enumerate the large amounts, Mr. Strode's has fallen through, Messrs. Tatham and Rye's has fallen through. The £86 in the assignees hands would have paid 4s. or 5s. in the pound on all my debts.

Mr. BAGLEY: Were you, in 1855, earning an income which, if all received, would have amounted to above £1900?

Bankrupt: As near £2000 as possible.

Mr. BAGLEY: If that £2000 which you expected from your labours had come in fairly as you expected, would you have been enabled to pay everybody?

Bankrupt: I should have been able to pay my debts, irrespective of it all coming in, if it had not been for the law-costs of the Leamington Local Board.

Mr. BAGLEY: Unfortunately, you were induced to bring an action against them for £112?

Bankrupt: Yes.

Mr. BAGLEY: They paid into court £45?

Bankrupt: £45.

Mr. BAGLEY: And you were, unfortunately, advised to go on with your action.

Bankrupt: Yes. To save expenses I agreed to a reference, and they ran up the costs to £200.

Mr. BAGLEY: It was a very roundabout way of saving expense to agree to a reference, certainly. You stated that in another case you were fool enough to bring an action, and I do not think you stated it too strongly and the result was that you found yourself beaten.

Bankrupt: I lost the cause, and within a week I paid their taxed costs, £78.

The COMMISSIONER: As far as I can understand your position, it arises from contracts failing.

Bankrupt: My bankruptcy arises entirely from the Leamington Local Board of Health.

The COMMISSIONER: That does not comprise the whole £1200?

Bankrupt: But that is merely a statement made twelve months ago. On the very day of my bankruptcy the largest amounts were all paid off by the very fact of my being a bankrupt.

Mr. BAGLEY: The fact of your being a bankrupt put an end to those contracts.

Bankrupt: "Forbes, £50;" there is only £10 of that due. "William Strode, £105;" he has taken the works on which he held security. "Sarl, £150;" that ceased to be a debt.

Mr. BAGLEY: Did that put an end to the contracts which were the main source of your income?

Bankrupt: It did.

Mr. BAGLEY: If it had not been for that, you would really have had means to pay everybody?

The COMMISSIONER: I take that to have been the real cause of the bankruptcy, as far I can collect, the failure of those contracts.

Mr. BAGLEY: Well, sir, that is a sort of thing which no man could have speculated upon. It is one of those things that must occur to everybody in business.

The COMMISSIONER: With reference to all the circumstances of the case, I should have said a word with respect to the not keeping of books, but I think that has been answered. The bankrupt has stated that the books of account were kept at the works, and even if there had been none kept at the works, I could not have said that the bankrupt had been guilty of an offence under the bankrupt laws unless it had been further shown that he had omitted to keep books with the view of defeating or concealing matters; and as for contracting these debts in 1866 without reasonable expectation of payment, I cannot say, having reference to his previous income, that he has done so. Therefore, although the result of the bankruptcy is certainly very unsatisfactory as far as the dividend goes, it does not appear to me that this is a case in which the bankrupt has been brought within the penal clauses of the Act of Parliament, and therefore he is entitled to his order of discharge.

Miscellaneous News.

BOMBAY GAS COMPANY, LIMITED.

The Fifth Ordinary Meeting of this Company was held at the London Tavern, Bishopsgate Street, on Wednesday, June 19—DANIEL THOMAS EVANS, Esq., in the chair.

The SECRETARY (Mr. W. Marshall) having read the notice convening the meeting, the following report and statements of account were presented:—

Your directors, in meeting the shareholders for the fifth time, have pleasure in presenting a statement of accounts made up to 31st of December last, and duly audited, with a report of the progress effected during the year.

Notwithstanding the depression of trade and monetary embarrassments consequent upon the financial crisis prevailing in Bombay, which have been unexampled in duration and severity, the progress of the company has been on the whole satisfactory; latterly it has shown a marked advance, which indicating itself by an increased disposition amongst the native population to consume gas, promises to become still more rapid and to prove enduring.

In the report for last year the number of lights on April 28, 1866, was stated as follows:—

Private consumers	3516 lights
Public lamps	438 ,,
Number of lights in course of fitting	1147 ,,
	5101 lights.

On April 27, 1867 (the date of our most recent advices), there were burning:—

Private consumers	7532 lights
Public lamps	2168 ,,
Number of lights in course of fitting	571 ,,
	10,271 lights.

There is also a considerable consumption of gas at public and private festivals, which must greatly tend to familiarize the natives with the use of gas, and make it popular amongst them. The average rate of increase of private lights (from which the main income of the company is derived), may be fairly estimated at 150 per week, or 7800 per annum. The cost of fuel being high, and on the increase in Bombay, your directors early made special provision for the introduction of cooking-stoves, and it is satisfactory to observe these are rapidly coming into use. The company's manager Mr. Proud, in his catalogue of requirements of the 13th of April, says "strong sheet-iron cooking-stoves are greatly required." A considerable income may be expected from this source.

The works, mains, and services continue in good condition, and fulfil their purposes effectively. The quality of gas and its illuminating power give universal

satisfaction. A large shareholder who has recently visited Bombay writes thus:—"The public thoroughfares are brilliantly lighted. The gas is very much brighter than any in London or most towns in England."

The relations of the company with the Government, municipality, and the public generally in Bombay, are on an amicable footing.

The revenue account it will be observed covers the interval extending from the 7th of October, 1865 (the commencement of lighting), down to the 31st of December last. At that date the amount due to the company in Bombay stood at £11,816 7s. 2d., of which the greater portion was owing by the municipality. This amount is larger than your directors could wish, but this extension of credit was under the circumstances unavoidable. Your directors have adopted the best means in their power to get in the gas-rents, and other items of revenue, with despatch and regularity, and they expect that an improvement will reward their endeavours in this respect. The small balance (£189) due on calls as appearing in the accounts has since been paid.

The net profit is £6489 10s. 11d., out of which the board recommend that £1602 18s. 9d. be set aside for "depreciation" (that being the amount stated by the company's engineer as the per centage usually allowed for that purpose), and a dividend at the rate of £5 per cent. per annum, free of income-tax, from the 7th of October, 1866 (when payment of interest out of capital ceased), to the end of the year. This will absorb a sum of £2678 1s. 8d., leaving £2208 10s. 6d. to be carried to next account.

Major William Fletcher Gordon and Daniel Thomas Evans, Esq., are the directors who retire from office by rotation, and they, being eligible, offer themselves for re-election.

Dr. *Balance-Sheet, December* 31, 1866. *Cr.*

To Capital authorized, viz.:— (50,000 shares, at £5 each, £250,000.)					By Construction, &c.			£155,355 12 11
40,000 shares, on which £5 per share have been called up and paid		£200,000	0	0	Shareholders interest account	£23,849	2 3	
10,000 shares, on which £3 per share have been called up	£30,000	0	0		Less unclaimed	120	2 0	
Less unpaid	189	0	0					23,729 0 3
		29,811	0	0	Amount due to the company			11,816 7 2
				£229,811 0 0	Goods *in transitu*			6,144 5 1
Interest and discount				2,424 5 8	Stocks, viz.:—			
Amount owing by the company in London		£9,820	19	5	Fittings	£26,912	15 4	
Ditto ditto in Bombay		1,217	7	5	Meters	8,515	18 5	
				11,038 6 10	Pipes, materials, tools, and sundries	3,969	4 10	
Balance, profit and loss				6,489 10 11	Coal, coke, tar, lime, and fire materials	3,675	19 9	
								43,073 18 4
					Cash at bankers, and in hand			9,643 19 8
				£249,763 3 5				£249,763 3 5

Dr. *Revenue Account, from the Commencement of Lighting, October* 7, 1865, *to December* 31, 1866. *Cr.*

To Gas and meter rental				£17,572 17 7	By Coal carbonized			£10,090 10 3
Coke, breeze, tar, fittings, and incidental receipts				11,753 3 5	Labour and materials			4,379 11 10
					Repairs			148 8 7
					General charges, including directors remuneration, salaries in India and London, rents, rates, taxes, and law expenses			7,520 15 9
					Interest on loans			476 19 10
					Allowance written off preliminary expenses account			220 3 10
					Balance			6,489 10 11
				£29,326 1 0				£29,326 1 0

The CHAIRMAN: Gentlemen, in the remarks I propose to submit to you, I shall, in the first place, address myself to the report of the directors, and amplify in some particulars the several paragraphs which appear therein; after which I propose to offer some observations that may be of interest and give information to the shareholders. Looking at the report, I will, first, briefly compare the progress in the lighting during the twelve months which have elapsed since we last had the pleasure of appearing before you; because the question of the progress of lighting is the vital question which affects this company—the extension of the public lighting and the supply of gas to private consumers are matters of great significance and value to the shareholders. If you refer to the report you will find that last year we had, private consumers, 3516 lights; we have this year no less than 7532, showing an increase of 4016, so that we have more than doubled the number of lights used by private consumers. The number of public lamps last year was only 438; this year we have 2168, being an increase of 1730. I think these facts must be very satisfactory to you, proving, as they do, that we have been most diligent in carrying out the great work for which we were incorporated, the lighting of Bombay with gas. Last year the number of lights in course of fitting was 1147, this year it is returned as 571 at the date of our most recent advices. This would appear, at first sight, a somewhat unfavourable circumstance, the decrease in the number of lights in course of fitting being 576, but it can be satisfactorily accounted for. Last year we stood in an exceptional position with regard to this matter. We were then fitting up two or three of the Temples that required about 1000 lights. Those lights, we have found, are not of a permanent nature, they are only required occasionally, but they swelled the number in course of fitting last year as compared with the present. The total increase in the number of lights of all descriptions is 5171, which, in point of fact, doubles the number we reported to you at our last meeting. I cannot but think this must be very satisfactory to the shareholders, showing that the consumption of gas is rapidly increasing. As stated in the report, our present average increase in the private supply is at the rate of 150 lights per week, or 7800 per annum; and, no doubt, this increase will continue in an arithmetic if not in a geometric ratio. If you will refer again to the report you will find a paragraph upon which, perhaps, it is advisable I should offer some explanation, and that is as to the extension of credits in Bombay. On the 31st of December last, we had outstanding the sum of £11,816 7s. 2d.; and I should tell you that of that sum £7050, or nearly two-thirds of the whole, was due from the Municipality. This has been a subject of anxious consideration with the directors, and we we have done the very best in our power to remedy such a state of things. We found our credits were continually extending, and we, therefore, deemed it necessary to change our relations with the whole body of consumers, both public and private. We entered into a new and substituted contract with the consumers we already had, and into a special contract with those who came in from day to day, to the effect that, as it is the custom in Bombay to pay monthly, we should charge 1 per cent. per month, or 12 per cent. per annum, upon all sums outstanding at the end of the month. We think this arrangement will work most beneficially. We believe, and we have some evidence to support that belief, that we shall, by this pressure which we have put upon consumers, get in our accounts with greater regularity, and that we shall not have to report again any further extension of credits, which certainly is a very serious matter. Now, gentlemen, I come to the question—and this, too, is a serious one—of the cost of production of gas. It cannot be denied that it is very high, but this is owing chiefly to the advance in the price of coals. Freights have been very much against us during the past twelve months. We based our calculations, when we fixed the price of gas in Bombay, upon the advice of Mr. Hawksley, who is not here to-day, as he is now under examination before a committee of the House of Commons. Those calculations assumed that we should be able to put our coals within the walls of our works at something like £2 a ton. Now, I am sorry to say that coal from England is fully £1 per ton dearer, laid down in Bombay, than when we landed our first 5000 tons previous to lighting the city. If you look at the figures you will find that this difference of £1 per ton (as we carbonize 500 tons a month upon the average) comes to about £6000 a year, which is equivalent to 2½ per cent. upon our capital. The coal question you will see, therefore, is one of the highest importance, and the directors have given it, from time to time, their most anxious consideration, and have done the best they possibly could in the interests of the shareholders. I mentioned, when last I had the pleasure of addressing you, that we were trying experiments with Australian coal. I may now tell you that those experiments have been successful. During the last six months included in the accounts we have obtained all we could; but we have found freights very much against us, and in the early part of this year we could not get vessels to go from Australia to Bombay at anything like the freights we considered fair and reasonable. But we have made this provision—we have chartered ships upon this side, going out with freights to Australia, and we have agreed with them, at 27s. 6d. per ton, to pick up coals for us there. And I should tell you that the Australian coal yields fully 9000 cubic feet of 13-candle gas per ton; so that it is a very favourable description for our use. At the present time we have no less than 11,200 tons of coal—more than one year's consumption—afloat either from this side or from Australia. Once only, and that was in December last, we ran short of coals. It is fair and proper that I should advise you of this, because possibly some remark may be made upon it. We had to buy some (but no very large quantity) to supply the deficiency—I believe it was 300 tons. We had chartered two ships, and had they arrived in due time we should not have been in that dilemma; but one of those ships was wrecked, and the other was no less than 5½ months on her voyage. We suffered no loss whatever from the wreck of the vessel, as the insurance not only covered the cargo, but brought in a profit of £570, which more than made up the loss we were under in supplying coals from another source in Bombay. There is a paragraph in the *Times* to-day which very remarkably bears upon the question I am now referring to. It refers to the profits of the Indian railways, and the writer states that they yield a clear profit of 2½ per cent., notwithstanding the freight of coal is so dear. I have stated that our experience of coal, doing the best we could for the company, is that we have to pay £3 per ton, instead, as we calculated at starting, £2 per ton. I will read the paragraph, because it shows how closely the experience of the great railway companies, who are so well organized, corresponds with our own. "At the existing rate of freights, coal and coke, before they are landed in India, cost 50s. per ton, and the extra charges, so far as the western and southern districts are concerned, raise the cost to about 60s." Coal being so dear in Bombay, we have found it necessary to make an alteration in the charge for gas. Assuming, in the first instance, that coal would cost us only 40s., we fixed the price of gas to private consumers at 7 rupees, and to the municipality at 5 rupees per 1000 cubic feet. We have, however, found ourselves under the necessity of raising the price to 7 rupees all round. I am happy to state that our manager reports he shall have no difficulty in getting that price, and if we do we shall be in flourishing circumstances with regard to revenue. I should next touch upon the income arising from residual products—the coke, tar, breeze, and ammoniacal liquor. At our last meeting I informed you that coke was fetching at best price 30 rupees per ton; I have now to state that it is realizing 40 rupees. Last year gas tar brought 7½d. per gallon; this year it is worth 1s. I have the satisfaction of stating that hitherto we have made no bad debts, and that is a circumstance which may be regarded as very satisfactory, when we consider the financial condition of Bombay, and the universal ruin that has prevailed there. When I say no bad debts you must take the statement with this qualification, that one small hotel proprietor is indebted to us some 50 rupees, which it is doubtful whether we shall recover, although our agent reports that he believes it will be paid. Gentlemen, I turn now to the balance-sheet. This time last year I told you our revenue from gas sold would soon be from £15,000 to £20,000. The exact return shows it to be £17,572. This year our experience, which extends only to the first four months, shows that the revenue from gas and residual products exclusive of fittings, is nearly £3000 a month, equivalent to £36,000 a year, or just double what it was last year; so that, in point of fact, the increase in the revenue is correlative with the increase of the private and public lighting, assuming that we shall go on at this rate for the remainder of the year. I have no doubt that we shall do so, because we have now turned the difficult point; the prejudices of the natives are fast giving way, and they are rapidly coming forward to consume our gas. If you will look at the balance-sheet, on the credit side is an item, "By shareholders interest account, £23,849 2s. 3d." Now you will observe that, in point of fact, we are paying you interest at this moment on this £23,849; a sum already in your pockets. By the Articles of Association we were compelled to pay, during the construction of the works, and until we had lit Bombay for twelve months

5 per cent. interest out of capital. When the company are in the receipt of a large revenue hereafter, it is my own private view, and I think it is the wish of the directors generally, that we should set apart a certain sum annually to repay that interest account, and which sum shall go to provide for future extensions of our works. You will bear in mind that our works have been so constructed, and the land bought in the first instance was so large, that we can double them whenever we find it necessary, at a very small part of the cost we have been at up to the present time. With reference to the "General charges in the revenue account, including directors remuneration, salaries in India and London, rents, rates, taxes, and law expenses," which amount to £7520 15s. 9d., I may remark that these extend over 15 months; but it may be interesting for you to know what are the particulars of this item. The salaries of engineers in India amount to £2187 10s. Bear in mind we have deemed it necessary to have a second engineer in India, competent in every respect to take the place of our general manager, should any casualty happen to that gentleman. Directors and auditors received £1071 1s. 3d., the directors taking of this sum £800 under the Articles of Association; rents, rates and taxes, £1476 18s. 3d., less sublet, £803 4s. 2d.; so that, in point of fact, in this latter item we stand at an expense of £673 14s. 1d. at Bombay and here. And I may, by way of explanation, state that at the time when we first commenced our works at Bombay rents were enormously high, and we had to pay very large sums for the premises there. Salaries in India and London, including secretary, accountants, clerks, messengers, and collectors, cost £2101 11s.; stationary, printing, advertising, postage, medical attendance, &c., £1386 11s. 11d.; law expenses, £100 7s. 6d.; making a total of £7520 15s. 9d. In conclusion, gentlemen, I will just read you an extract or two from our manager's recent advices, and also from a letter addressed to Major Suart by a gentleman holding a high position in Bombay—Colonel Kennedy, who is secretary of the Public Works Department—from which you will see that our works are in a most excellent condition, and that the supply and quality of gas furnished by the company are such as to give universal satisfaction. [The chairman here read the extracts he referred to.] I now move—"That the report and statements of account which have been circulated among the shareholders be received and adopted, and that the dividend recommended by the directors be payable on the 1st of July next."

Major SUART seconded the motion.

Mr. RANSFORD inquired whether the item of £26,912 15s. 4d. for "Fittings" in the balance-sheet, consisted of chandeliers and gas-fittings, or whether it was permanent plant.

Mr. STOKER, while expressing his satisfaction with the position of the company generally, could not help expressing regret at the announcement made by the chairman that the directors had been obliged to advance the price of gas. He hoped, as soon as they were in a position to do it, they would voluntarily return to the former scale of charge. He was glad to hear the chairman say that the company had made no bad debts, but looking to the amount of money still outstanding, according to the accounts, he thought they must not be too hasty in congratulating themselves on an immunity from a contingency of this sort. He objected to the policy of charging the consumers with interest on their rental accounts if unpaid after the expiration of a month, and thought the better plan would be to offer a discount for prompt payments on their part.

Mr. DARBYSHIRE inquired what the cost of Australian coal was on the works at Bombay.

Major SUART: About 45s. per ton.

Colonel RIGBY said he had recently returned from Bombay, and could testify to the admirable state of the company's works, and to the brilliant lighting of the city, and all the roads in the island. He believed there was no town in England which could compare with Bombay in this respect, and, excepting Paris, he did not know any better lighted place abroad. The gas was of most excellent quality, the lamp-posts very handsome; and now that the natives were becoming accustomed to this mode of lighting, and had surmounted their prejudices as to the dangers attending the use of gas, he had no doubt the consumption amongst the inhabitant householders would rapidly increase. When it was considered that Bombay was the second city in point of population in the British empire—next to London in the number of inhabitants—it was clear the consumption of gas must be enormous in the course of a few years. With respect to insisting on monthly payments, he regarded the step taken by the directors as quite correct, inasmuch as it was the custom in Bombay to settle all trade bills and household expenses in that way. He was at the ball at M. Sassoon's referred to in the letter read by the chairman. There were 15,000 lights in the grounds; every one present expressed admiration at the way in which the illumination of the place was conducted, and he confessed that he never saw anything more beautifully arranged.

Mr. LYSLEY wished to say a few words with respect to a very important subject already adverted to by the chairman. So far as the remarks of the chairman went they were satisfactory, but he had not dealt with the question of coal quite so fully as could be desired. The shareholders had been told of the greatly increased cost of delivering coal from this country on to the works at Bombay. He imagined that the coal from Australia would in future tend very much to remove the necessity for shipping it from this country. He happened to be a shareholder in the Australian Agricultural Company, which worked mines at Newcastle very extensively, and he had no doubt it was from them that this company obtained their supply.

The CHAIRMAN said it was.

Mr. LYSLEY said the real question in this case was the cost of freight, because the coal itself was now sold at 8s. per ton, delivered on board.

The CHAIRMAN said the company paid 9s. 3d. per ton, free on board; but probably the price had been reduced in the last six months.

Mr. LYSLEY said Australia was not the only place to be looked to for a supply of gas-making material, and probably the bituminous shale of Bahia, which could be obtained very cheap, and produced gas of a high illuminating power, might be advantageously employed, mixed with coal. The up country of Bengal also grew cotton very extensively, as was well known, and the cotton-seed and refuse material were being used for the purpose of gas-making.

Major SUART said it had been tried by this company without success, the cost of cotton-seed being too great.

Mr. LYSLEY produced a specimen of a material which he said was mainly expressed from the cotton plant and seed, and possessed a high illuminating power. The cost was 52s. 6d. per ton in England, and in a London company with which he was connected it had been advantageously employed. Of course all these things were matters of calculation for the directors, there being no residuum from these substances to sell after the gas was extracted.

Major SUART said it was not so much the expense of the material as the cost of freight. As long as the company could get cheap freights, the coal from this country and Australia was cheaper than anything else they were likely to obtain, because of the returns from the sale of coke, the the price of which had largely increased. With reference to shale, he believed, if it could be advantageously employed, they could get a supply from the shores of the Persian Gulf as cheaply as anywhere. But English and Australian coal was what they must mainly look to. They had had freights from England as low as 19s. per ton; now they were paying 45s., but, directly the prosperity of Bombay returned, they hoped to be able to send out coal again at comparatively nominal freights.

Mr. STEPHENSON CLARKE objected to the raising of the price of gas, believing that it was not necessary, for, though coal was dearer, the company obtained better returns for their residual products. Most of the other portions of the chairman's speech were very satisfactory. He wished to know whether the company's engineer, Mr. Hawksley, had been settled with, how much his remuneration was, and also how much the original estimates for the works had been exceeded. Referring to the accounts, he expressed regret that so large a sum as £26,912 should appear under the head of "Fittings," and thought it was not judicious that so much capital was locked up in that manner. He asked the directors to consider the propriety of holding the meetings of the company half yearly.

Major BAYLEY said he thought when so large a sum as £11,816 was due to the company it was rather premature to congratulate themselves that they had made no bad debts.

The CHAIRMAN said a large proportion of this sum was due from the municipality, who were safe paymasters, and who had agreed to pay interest on the account.

Major SUART said the directors had been advised that the money would be paid this month.

Colonel RIGBY said the municipality were raising fresh taxes, which would give them abundance of money.

The CHAIRMAN said the chief commissioner had informed them that there would be no difficulty in payment after the 3rd of July, and that the payments would then be regular.

Major SUART added that the municipality had taken power under their new Act to expend £25,000 a year on the lighting of the city.

Major BAYLEY remarked that the accounts of the company being made up to the 31st of December, the meetings of the shareholders ought to be earlier than the end of June.

The CHAIRMAN said it was a very natural conclusion, and probably, in future, the directors would be able to arrange for its being held in April, as when the company was first incorporated; but he did not see how it could be held earlier, because of the time necessary for making up the accounts. Their accounts, he believed, were made up on the best model—viz., the Nottingham Gas Company's accounts, supplied by Mr. Hawksley; but as a matter of fact, this was one of the causes of delay this year, inasmuch as it necessitated a further communication with Bombay as to one or two items.

Major SUART remarked that the stock-taking at the end of the year required time, and it was on this account that the directors, on the last occasion, took power to hold the meetings later.

Mr. DOUGLAS HAMILTON referred to the outstanding liabilities, and asked how much of the £11,816, of which £4800 was due from private individuals, the directors considered might be looked upon as a bad debt. The amount due to the company was equal to 5 per cent. upon their capital of £230,000.

The CHAIRMAN replied that the directors did not apprehend any portion of it was bad, seeing that up to the present moment they had not lost more than £5 in that way, if, indeed, it should turn out that they had lost that, since the company commenced lighting 18 months ago.

Mr. DOUGLAS HAMILTON said he observed, on the debtor side of the balance-sheet, an item, "Interest and discount." He presumed the interest was on deposits and shares called but not paid up; he did not understand to what the discount referred.

The CHAIRMAN said the secretary informed him that it was the profit received upon Exchange transactions. In answer to further inquiries by the honourable proprietor, he said the "Amount owing by the company in London" was not for the purchase of machinery, but represented advances which the directors had been obliged to obtain for the purchase of coals. They borrowed £6000 to pay for coals, of which, as he stated, they had now 11,200 tons afloat and ordered. The balance now due by the company of that sum was £2500. With reference to the item in the revenue account, "Allowance written off preliminary expenses account," he might mention that by the Articles of Association they were required to set aside annually from the first time of making a profit a certain sum to pay off those expenses. This year they had written off £220 3s. 10. The accounts of the company were audited as strictly as he believed it was possible for accounts to be audited; but, of course, the auditors had to deal with the accounts as they came over from the other side, and the only verification of those accounts was the vouchers forwarded for the respective payments made. Mr. Proud, Mr. Freeman, and the company's accountant in Bombay—a gentleman of experience, named Harrison, were responsible for the truth of all the accounts furnished.

Mr. DAVIDSON said, as one of the auditors, he might state that they had seen vouchers for every item in the accounts, and if they had had the least doubt respecting any payment, they would not have certified it.

A PROPRIETOR, alluding to the observations of Mr. S. Clarke as to the impolicy of the company supplying fittings, said he thought that gentleman, although he might know a great deal about the manufacture of gas, could not be conversant with the early history of gas companies. He, himself, knew that at the establishment of the Liverpool Gas Company, not only did the ironmongers in the town refuse to supply fittings, but they would not furnish workmen to fit up premises with gas, so that his own father-in-law, who was connected with the company, not only had to supply fittings, but to become gas-fitter to the company.

Major SUART said the stock of fittings in the company's possession might appear large, but had the prosperity of Bombay not been so seriously interfered with, that stock would all have been disposed of before the present time.

Mr. LYSLEY (a director) said the company would not have undertaken this department of the business if they had not been driven into it by the failure of two companies which were started for the purpose. Had either of those companies succeeded, the directors would gladly have transferred their stock to them.

Mr. DUNDAS inquired the price of Australian coal, and its value for gas-making purposes.

The CHAIRMAN replied that it cost the company 45s., and that they obtained from it 9000 cubic feet of 13-candle gas per ton. But the question of residual products was a very important one for the company, and the Australian coal did not produce such good coke as the English coal. The

directors sent out orders for 3000 tons of coal from Australia, but the freights were against them, and therefore they chartered vessels on this side to take out coal. In answer to Mr. Lysley, he said there was no market in Bombay at present for any other residual product than coke and tar.

Mr. Scott called attention to the Articles of Association with reference to the period of holding the annual meetings of the company, also to a provision by which the shareholders were precluded from inspecting the books of the company, which he thought was a very monstrous thing, especially as the accounts presented did not give them all the detailed information they had a right to expect. On the debit side of the revenue account, the amount for coke, tar, breeze, fittings, and incidental receipts was all lumped in one sum. It was very important that the shareholders should know how much was received under each head.

The Chairman said he could supply the information.

Mr. Scott had no doubt of the willingness of the directors to furnish all the particulars, but he thought the shareholders were entitled to it prior to the meeting, so that they might, by comparing the accounts from year to year, be able to form a judgment as to the progress of the undertaking. The chairman had informed them that the increase in the public lights during the past year was 1730. There was not likely to be any such increase in the future, and, as they received a large profit from the fittings, it was important that the shareholders should know how much of the £11,816 was due on that head. The chairman had given the details of the £7520 under the head of "General charges;" but he (Mr. Scott) could not help remarking that, in a concern in which the total available balance was only £6489, this did appear a very large sum, and he thought they had a right to ask for an analysis of this item, not in the speech of the chairman, but on the face of the accounts prior to the meeting. He also thought they ought to know the quantity of coal carbonized in the year, and the quantity of coke sold, and many other details. He also wished for information respecting the preliminary expenses. It seemed, from the Articles of Association, that a sum of £5500 was to be paid to certain gentlemen, some of whom were on the board now, as soon as 8000 shares were taken. If so, the directors had received, with the £800 a year for remuneration, no less than £9500, when the whole sum paid to the proprietors was only about £24,000.

Major Suart said this matter was explained at the second general meeting of the company, but the directors were quite ready to explain it again.

Mr. Lysley (a director) said he was one of the original shareholders, and was asked to be one of the guarantors, but he refused, thinking that the liability was too great. At the time the company started there were many hitches in the concern, and actions were brought against the gentlemen whose names appeared in the articles by the person who had originally the concession in Bombay. The expenses in these matters might have been very great, and it was arranged that these four gentlemen should have a sum of money, which certainly at the time was not regarded as by any means too large, to guarantee the company against any claim. It was known that the feeling of juries was always against companies, and no gentleman would have subscribed for shares at the commencement of this undertaking if there had been any likelihood of actions being brought against the company.

Major Suart said at the second meeting the gentlemen named offered to give back the money to be relieved from the guarantee. The company, however, declined to do that, and the money received was paid into a fund to compound with the persons who had actions against them.

Mr. Scott said he had not heard this explanation before. He thought he had stated enough to show that there were some things in the Articles of Association which it was desirable to amend. He hoped the directors would take the subject into their consideration.

The Chairman said he had no doubt the 107th article, relating to the inspection of the books, was taken from some other form, and he confessed that until now he had not been aware that it was of so prohibitory a character. If the honourable proprietor who had spoken on the subject would communicate with the directors, and furnish them with his objections to that and the other clauses referred to, the board would give their attention to the subject, and might be able, at the next meeting, to propose some alterations.

Mr. Scott wished it to be understood that he made the suggestions in the most friendly spirit, and without imputing anything to the directors, but he thought the time had arrived, now that the company was in full operation, to make some alteration in the rules.

Mr. Harrison thought the accounts, upon the whole, were very satisfactory, but they were not sufficiently full and comprehensive. He felt sure the directors desired to give every information in their power to the meeting, and believed it would save a great deal of time if the suggestions made by Mr. Scott were carried out. Mr. Scott had called attention to the preliminary expenses, and without wishing to go again into that subject, he would ask what was the total amount of those expenses.

Major Suart: £7000.

Mr. Harrison said he thought if that had been stated in the accounts instead of only the amount to be written off for the year, it would have prevented the necessity for a single observation. The only question was, how much they could afford to reduce that amount per annum. It was very satisfactory to hear of the great increase which had taken place in the number of public and private lights, and if the directors would in future furnish the details of the quantity of coal carbonized and gas made, as well as the returns under separate heads for residual products, it would enable the shareholders to ascertain for themselves, without waiting for the statements from the chair, whether the company's officers in India were doing their best for the interests of the company.

The Chairman, replying to the various remarks made, said the board would take into their earnest and early consideration the propriety of appointing an auditor or inspector of accounts in Bombay. In preparing their balance-sheet the directors had felt it desirable to put everything in as compendious a form as possible, feeling that a large balance-sheet was a very cumbrous and sometimes an embarrassing thing. At the same time, any suggestion that could be made with a view to improve it, the board would cheerfully take into consideration. With reference to the raising of the price of gas, he could assure the meeting that that had been a subject of anxious and protracted consideration. The directors were very reluctant to make the change, but they acted on the distinct advice of their engineer, Mr. Hawksley, who pointed out to them that it was absolutely essential, if they were to make any dividend at all. The directors would be most happy to reduce the charge, and would reduce it as soon as they could get the price of coals down to 40s. or 45s. As to the question whether Mr. Hawksley had yet been settled with, he had to state that a considerable sum had been paid that gentleman; but the company had not yet been furnished with the particulars of the exact amount due to him. Mr. Hawksley had been paid £3000, and there was probably now due to him £1500, or £2000 at the most. The company paid Mr. Hawksley no more than any other gas company paid for similar services—viz., 5 per cent. upon the cost of construction.

A Proprietor expressed a doubt whether, under the circumstance that there was an open and unascertained account due from the company to their engineer, it was prudent to declare any dividend at all upon this occasion.

Major Suart said the claim of the engineer was a charge against the construction account, and not against revenue.

Mr. Charles Hawksley said the only charge his father had against the company was the usual professional charge for designing and constructing the works, and that charge would be placed by the directors to capital account, it being an expenditure entirely relating to construction, and therefore chargeable to that account.

The motion was then put, and carried unanimously.

On the motion of Major Suart, seconded by Mr. Scott, the chairman, being one of the retiring directors, was cordially re-elected; and, on the motion of Mr. Young, seconded by Mr. Lysley, Major Gordon was re-elected to a seat at the board.

The Chairman said it became his duty now to refer to a communication received from a very influential shareholder, which the directors thought deserving of serious consideration. The suggestion was that the board was deficient of the commercial element, and, acting upon that suggestion, they had elected, subject to the approval of this meeting, their auditor, Mr. Davidson, a gentleman thoroughly acquainted with the whole of the affairs of the company, having a large commercial experience and well known and respected at Bombay and at home. He had now to propose that the election of Mr. Davidson by the directors be approved by the shareholders.

Major Suart seconded the motion, remarking that Mr. Davidson was one of the largest shareholders, and a gentleman he had been long anxious to see occupying a seat at the board.

The motion was put, and carried unanimously.

The retiring auditor, Mr. Deeley, was re-elected, and a vote of 25 guineas for the auditors services during the past year was taken. There being no candidate for the vacant auditorship, the chairman announced that the office could be filled up at the proposed half yearly meeting in December next.

A cordial vote of thanks to the chairman and directors, for their able management of the affairs of the company was then adopted.

The Chairman acknowledged the vote. The directors, he said, felt very much flattered and gratified by the kind consideration given to them by the shareholders, and for the compliment just paid to them. He could say most conscientiously that they had all striven with the greatest earnestness and diligence to advance the prosperity of the company, and that they would continue to do so as long as they enjoyed the confidence and approval of the shareholders.

METROPOLIS GAS SUPPLY.

City Court of Sewers, Guildhall—Tuesday, June 11.

At the Meeting of the Court, held this day, the following report of Dr. Letheby upon the quality of the gas supplied to the City during the previous quarter was presented:—

To the Streets Committee of the Commissioners of Sewers.

Gentlemen—In the course of the quarter which has just expired, there have been 710 examinations of the gas supplied to the City: 235 of them were of the City Company's gas, 235 of the Chartered, and 240 of them were of the Great Central Company.

Each of these examinations is the mean of ten observations, and the following are the results:—

Illuminating Power in Standard Sperm Candles.

	City Co.	Chartered Co.	Gt. Central Co.
Maximum	14·94	15·07	15·64
Minimum	11·96	11·63	12·35
Average	13·45	13·63	13·89

In the corresponding quarter of last year the average illuminating power was as follows:—City Company's gas, 13·51; Chartered Company, 13·32; and Great Central Company, 13·61. Practically, therefore, the illuminating power has been nearly the same in the two quarters, and it has exceeded the standard of the Act of Parliament to the extent of about 13 per cent.

As regards the chemical quality of the gas, I have to report that there have been 170 examinations of the gas for sulphur—viz., 57 of the City Company's gas, 56 of the Chartered Company, and 57 of the Great Central, and the results are as follows:—

Grains of Sulphur per 100 Cubic Feet of Gas.

	City Co. Grs.	Chartered Co. Grs.	Gt. Central Co. Grs.
Maximum	21·06	25·53	26·34
Minimum	5·27	15·52	9·71
Average	11·58	20·23	17·75
Total no. of observations	57	56	57
Do. do. when in excess of standard	2	29	16

From which it appears that the average amount of sulphur in the Chartered Company's gas has been above the quantity sanctioned by Parliament; and that of 56 examinations there were 29 where the amount of sulphur was excessive.

In the corresponding quarter of last year the average amounts of sulphur were as follows:—Great Central gas, 21·12 grs.; Chartered gas, 20·64 grs.; and City Company's gas, 20·63 grs.

The gas of each of the companies has on all occasions been free from sulphuretted hydrogen, but that of the Chartered Company has been generally overcharged with ammonia; and lately the same has been the case with the gas of the Great Central Company.

The pressure of the gas has ranged from 9/10ths of an inch to rather more than three inches.

THE PUBLIC LAMP QUESTION IN CHELTENHAM.

An Adjourned Meeting of the Cheltenham Improvement Commissioners was held on Monday, at the Queen's Hotel, for the purpose of considering as to the renewal of the commisioners contract with the gas company—Dr. Collings Robinson, in the chair.

From the minutes read by the assistant clerk, it appeared that the gas committee, since holding the meeting at which they came to a resolution advising the board not to renew their three years contract with the gas company on the same terms as formerly, had met on two occasions, viz., on the 12th and 13th of June, when it was resolved to the following effect:—That the committee recommend the board to enter into a contract with the gas company for a limit of three years on the following basis. 1. That the price to be paid by the board for gas consumed should be 3s. per 1000 cubic feet. 2. That the price to be paid for the use and maintenance of the plant and lamps, and for lighting and extinguishing the same, be 14s. per annum per lamp. 3. That 55 minutes per day be allowed for lighting and extinguishing the lamps. 4. That one uniform burner should be pro-

vided by the board for all the lamps, and that it should also be placed at a uniform height in all the lamps. 5. That no alteration except where necessary be made in any of the lamps, apparatus, &c., without the sanction of the committee. 6. That the commissioners be allowed to have a test-meter to be affixed to every 12 lamps in order to ascertain the quantity of gas consumed. 7. That the gas supplied by the company should be of such quality as should provide by the Birmingham standard burner 5 cubic feet per hour in each lamp, and be of 13½ sperm candles illuminating power; and that the commissioners should be allowed to provide and use a test apparatus at their offices near the centre of the town to ascertain whether the quality and illuminating power of the gas be as above stated; and if it be proved to the satisfaction of two justices, not directors or shareholders of the company nor members of the board of commissioners, that the general quality or illuminating power of the gas as tested did not accord with the contract, the company should forfeit any sum not exceeding £20, as such justices should determine.

Mr. PAUL, in moving the adoption and confirmation of the committee's report, confessed that it was with very great reluctance that he recommended the prolongation of what he might term that "everlasting" controversy respecting the gas. The facts were, that the board had received certain propositions from the gas company for the renewal of the contract between the company and the board, and which propositions, to use rather a strong term, had been discarded. He did not know that he had any right to quote the authority of a gentleman who sat at that board, but from the representions made by the gentleman alluded to, he (Mr. Paul) understood that the propositions were final on the part of the company. Upon the supposition, however, that the proposal of the company was not final, the committee had proceeded as detailed in the report. To come to the merits of the case, the proposition for a renewal of the contract was not so formidable as it appeared to be, inasmuch as out of the seven heads into which the committee's proposal was divided, the company had already signified their acquiescence to five of those heads. In respect to the committee's recommendation with regard to the test-meter, the company had practically agreed to that; and, as he had previously had occasion to remark, the application of a test-meter involved the fixing of a regulator to all the lamps, which ensured uniformity in the amount of light, thus improving upon the present state of things when the quality of the light was not better in the earlier hours of the evening when it was most needed, than in the morning when it was scarcely required. The company had no objection to the test-meter, but at the same time they asked the question, "What security have we that every twelfth lamp represents the quantity of the gas consumed in the other eleven lamps?" As to illuminating power, the committee fell back on what had been proposed, that the gas supplied should be of illuminating power equal to 14 candles—which was afterwards modified to 13½—the proposition of the gas company being 12. If the company refused the above terms, the committee recommended the board to renew the present contract for one year, and to proceed to erect their own gas-works in the meantime. As would be seen, the chief point of difference was the illuminating power which the committee required to be raised from the company's own proposal of 12 candles to the 13½. He (Mr. Paul) hoped some one would add to the resolutions before the board a request, that the company should give the board some sort of reply forthwith. However, whether this was so or not, he individually would as soon deal with the company upon a sort of hand to mouth supply. A gentleman at the board had, within the past few days, been kind enough to send him an account of the proceedings before the House of Commons, in reference to the Metropolitan Gas Bill, and what he saw in that report had led him to look further into the matter; and he must say that the reconsideration of the subject in all its bearings had led him to the conclusion that the best method of solving the difficulty, and the one which would conduce best to the interests of the town at large, would be that the board should manufacture its own gas. He would, with the permission of the board, refer to what was said in reference to the matter by the town-clerk of Manchester, when before a committee of the House of Commons. From that gentleman's statement it appeared that gas was manufactured by the municipal authorities, that the profits were applied to city improvements, and that the transactions had been so successful that nearly the whole of the improvements in Manchester had been effected out of the gas profits. He (Mr. Paul) held the return in his hand, from which it appeared that since 1844 upwards of £700,000 had been paid out of gas profits to the Manchester Improvement Committee.

The CLERK reminded Mr. Paul that about thirty years ago Manchester obtained an Act which Parliament would not be disposed to give now—an Act enabling a public body to manufacture gas at a profit. He mentioned that he tried all he could to get a clause in the Cheltenham Improvement Bill which should enable the commissioners to do that, but it was knocked on the head by Lord Redesdale and the other potentates, who would not allow the clause to remain.

Mr. PAUL, in continuing, observed that he referred merely to lighting the public streets with gas.

The CLERK: Undoubtedly, and cheaper than they will supply it.

Mr. PAUL: The commissioners did not want any exceptional powers, but if they required them he believed they could obtain such powers. The matter had been gone into by the gas inspector at considerable length, and if the inspector's figures were reliable—and he (Mr. Paul) believed they were—a very large saving would accrue to the board if they adopted the course recommended by the committee, which, after the repayment of the money borrowed to carry out the works, would amount to something like £2000 per annum; and if Cheltenham increased in size during the next 20 years, and the 1200 lamps became 1800, there would be a proportionate increase in the amount saved. He enforced the necessity of effecting a settlement of the question at once. The gas company admitted that they received 10 per cent. on their money.

Mr. DOWNING: Eight and a half.

Mr. PAUL, in continuing, said it was admitted that the gas company received interest at the rate of 8½ per cent., and if the commissioners could borrow money at 5 per cent., they would by manufacturing their own gas effect a saving of 3½ per cent. He had attended the board that day to enforce upon it the necessity of a full, proper, and thorough consideration of the subject, in order that some definite conclusion might be come to upon the question, and that it might be decided "yea" or "nay." He submitted to the board his own private opinion, which was an independent one, for he had nothing either to gain or lose by a settlement of the matter; and he wished to impress upon the board that the true course and the wisest one for adoption was that the commissioners should be the manufacturers of their own gas. In conclusion, he formally moved the adoption and confirmation of the committee's resolutions.

Mr. SADLER inquired if the present decision of the committee differed in any important respect from their former proposal.

Mr. PAUL: Not in any important particular. He then recapitulated the proposals, observing that the gas company had agreed in the main with the first five. He mentioned, as showing that the labours of the committee and the board in connexion with the gas question had not been in vain, that Mr. Barlow, who was lately employed by the company to make a report, had remarked to the effect that the inhabitants of Cheltenham were in danger of having their streets in darkness in consequence of the exactions of the Improvement Commissioners.

Mr. MARSHALL seconded the motion.

Mr. SWEETING inquired, in the event of the commissioners manufacturing their own gas, whether they would be allowed to lay pipes out of the limits of the borough.

Mr. WINTERBOTHAM: No; only in the parish of Cheltenham.

Mr. SWEETING: Only where the roads are dedicated to the public?

Mr. WINTERBOTHAM: Anywhere, with the consent of the parties; the gas company cannot do anything more.

Mr. SWEETING having asked other questions (still retaining his seat),

Mr. HARFORD protested, observing that Mr. Sweeting, who was a member of the Gas Committee, did not attend the meetings of the committee, and retained his seat, asking questions round the table, which he (Mr. Harford) submitted was not fair.

Mr. SWEETING retorted that he did not ask questions round the table and that he was not able to attend every meeting of the committee; if Mr. Harford set up a new rule that no man should speak if he was on a committee, it was a rule he (Mr. Sweeting) could not understand.

Mr. HARFORD did not wish to rule Mr. Sweeting; that was the chairman's duty. Mr. Sweeting had spoken several times, and because he was asked to rise and speak to the question——

Mr. SWEETING: Mr. Harford has spoken if Mr. Sweeting has not. If he wishes to rule the board, he will not rule Mr. Sweeting.

The CHAIRMAN (addressing Mr. Sweeting): I cannot allow you to put so many questions.

Mr. SWEETING said he should put his question. He inquired if the resolutions of the committee were passed that day, whether they were the ultimatum of the board.

The CLERK: The resolutions speak for themselves, my good friend. He reminded Mr. Sweeting that, if the resolutions passed, the board confirmed the proposition for making their own gas.

Mr. W. S. DAVIS expressed an opinion that the majority of the board were not prepared to confirm the expenditure of some £22,000 or £23,000 in the erection of gas-works. He remarked upon the injury caused to furniture by inferior gas, and was convinced that the board, by manufacturing their own gas, would indirectly injure the private consumer, inasmuch as the gas company, being deprived of the custom of the board—the gross amount paid yearly by the latter to the gas company being £5000—would raise the rate of gas per 1000 cubic feet, as supplied to the private consumer, from 3s. 3d. to 5s. He begged to propose, as an amendment, that the last paragraph of the committee's proposal, referring to the board's manufacturing their own gas, stand over for consideration.

Mr. ONLEY begged to second the motion, mentioning, in regard to Mr. Paul, one of the four gentlemen who had taken so active a part in forming the present proposal, that he had not attended the Sewage Irrigation Committee, whilst he (Mr. Onley) had remained away from the Gas Committee. With regard to the seven propositions before the board, the gas company had agreed to five of them, and the only real difference was the 1½ candle illuminating power between the 12 candles of the company and the 13½ of the board. As the company had given the board an average illuminating power of 14 candles during a former year, it was right to assume that at the present time they would grant 13½ illuminating power. He advocated conciliatory measures, and, with Mr. Davis's permission, would substitute the following words for those proposed to be left over for consideration by Mr. Davis:—"That the company having generally met the views of this board, they be requested to concede this point." However, whether Mr. Davis would agree to those words or not, he would be happy to record his amendment.

Mr. PARSONAGE was of opinion that the board should settle the question "yea" or "nay" as to the manufacture of their own gas. It had been stated that the company had agreed to five out of seven propositions put forward by the committee, but he would remind the board that they had only agreed to five out of ten, which was the number of proposals made in the first instance. Having alluded to the importance of the board showing the company that they were determined to manufacture their own gas, unless met in the manner proposed by Mr. Parsonage, he reminded the board that they were in the same position now, as regards the question, as they were three years ago. He thought, considering that the gas company could afford to pay 10 per cent. to one class of shareholders, and 7½ to the other, and seeing that they were extending their premises out of the profits—[Mr. FALLON: "No, no."]—something more ought to be done in the way of meeting the commissioners. What had been said with regard to the private consumer was absurd. Mr. Davis had said that the board, by erecting their own gas-works, would spend a good deal of money—some £22,000. This was very true; but that sum, if borrowed, could be repaid in 27½ years, and a saving of £6000 per annum effected besides. At the end of the 27 years, the stock and plant would be the commissioners own property, and they would have facilities for supplying 2000 lamps if required. Mr. Parsonage concluded with again impressing upon the board the necessity of effecting a speedy settlement of the question.

Mr. FALLON observed that, before the board committed themselves to the erection of their own gas-works, it would be as well for them to consider the question. Mr. Bower, in his report, had told the board that the maximum illuminating power to be obtained from the coal of the district was 14 candles. After reminding the board that he had the interests of the town as well as the gas company at heart, he mentioned that Mr. Bower's maximum of 13½-candle gas was fixed by the committee as their minimum, and he did not think the gas company would feel themselves justified in agreeing to the proposal of the committee. The company were bound by their Act to supply 10-candle gas, and had given the board gas of 14 candles illuminating power.

Mr. PAUL: For one year.

Mr. FALLON denied that; it was for more than one year. It was to the interest of the gas company, as a commercial body, that they should not for one moment refuse to supply gas of the greatest possible illuminating power. What he understood the gas company to say was, that they had always done this, and were ready and desirous to continue to do so; but they would not be bound by a contract which would compel them to supply 13½-candle gas as the minimum, and which, did they not comply with its terms, would subject them to a penalty. He would likewise remind the board that many of the requirements which were termed "concessions,"

the company had always been ready and willing to grant. The company had acceded to almost every proposition of the Gas Committee with the exception of the compulsory difference between 12 and 13½ candles, for let it be well remembered that the only point of difference between the board and the company was the compulsory illuminating power.

The CLERK: The test-meter.

Mr. FALLON did not consider the test-meters anything. The question was, whether the board would run the risk of spending £22,000—which would, perhaps, in the end, amount to £32,000—just because they wished 13½-candles illuminating power inserted in the contract; and the directors—who were honest men, and wished to carry out faithfully that which they entered into—wanted 12-candles. Besides this, they would have to go over something like 60 miles of country with their pipes, not having power to go over private ground.

Mr. WINTERBOTHAM: Nor have you.

Mr. FALLON, in continuing, said the company had an Act of Parliament which would enable them to do almost anything. Another interest had been alluded to—the interest of the private consumer. It was usual in some places to make the private consumer of gas pay for the public lights, but that practice had not been followed in Cheltenham, for, perhaps, the rate upon the public light had been increased in order to relieve the private consumer of the burden; and it was not a proper course for a public body to sanction to endeavour to throw the burden on the private consumer. In respect to what Mr. Parsonage had said as to the company extending their works out of the profits, that was not a fact, the Act of Parliament not allowing them to do so. With regard to the test-meters for quantity, which the commissioners proposed to attach to one in every 12 lamps, the company were quite right to wish the test-meter to be affixed to every lamp. He thought the board should not place themselves in the position of having to borrow the sum of £22,000, as they said, but much more, as he (Mr. Fallon) affirmed, for the manufacture of their own gas in the face of the other sum of money they were talking of for irrigation, simply because they wished the 13½ to be placed in the contract instead of 12, as representing the illuminating power of the gas to be supplied.

The CLERK expressed an opinion that Mr. Fallon was in error when he said that the gas company had extraordinary powers as regards land, for, as he understood the clause which related to the subject in their Act, they had no more power than the commissioners.

Mr. WINTERBOTHAM: None.

Mr. FALLON observed that he did not imply that the company had power to take or purchase land, but only to convey their pipes and mains.

Mr. WINTERBOTHAM, in the course of an able speech, hoped that the board would come to a final settlement of the present question, for they had been considering, for nearly twelve months, the illuminating power, and for more than two years the whole question of the supply of gas. Let the company say "Yea" or "Nay" to the proposal of the committee, and if they would not agree to the resolution, the board had no alternative but to manufacture their own gas. It had been clearly shown by Mr. Bower that it was to the interest of the commissioners to make their own article. The company had, in the year 1866, when the contract was only a yearly one, supplied gas to the board of 14 candles illuminating power, and the Gloucester Company had agreed to give their customers gas of a like quality. This being so, he did not see why it should be asserted that 14-candle gas could not be obtained from the coal of the district, and why the company should refuse to supply 13½-candle gas, which was all required by the board. Mr. Fallon had stated that the gas directors were a respectable body of men. Well, nobody wished to deny that, but they had not kept up the usual quality of the gas supplied to the town during the last month. At the end of May the gas supplied to the commissioners was as high on one occasion as 15 candles illuminating power; but on the 1st of June it decreased to 13¼, and gradually dwindled down until Saturday last, when it was 10. He maintained that there was some purpose in the decrease he had indicated, and if not, it was a very singular fact that during the month of June the town should have had such a very low quality of gas. Besides the fact he had alluded to, during one night in the present month, no less than 187 lamps were extinguished, and for not one of those evils would the company give the board any remedy. He asked if that was not enough to induce the board to come to some final resolution on the subject. Mr. Fallon had said that the company would have their interest; that was very true.

Mr. FALLON having made some remark inaudible to the reporters,

The CLERK said: Indeed, I believe you have too much. The shareholders would have pocketed 10 per cent. were they not prevented by law from taking more than 7½ upon the new shares.

Mr. WINTERBOTHAM continued, reminding the board that according to the company's accounts they made in the year 1858, £4266, and they had only a right to take £3906 of that sum on their shares. In 1859 they made £5324, and had only a right on their shares to £4187. In 1860 the profits were £5887, when £4575 was the sum required to pay their dividends. In 1861, £5087 was received as profits, when the sum required was £4699. In 1862 it was £6129; required, £5024. In 1863, £7047; when the amount required was only £5125. He would ask what had been done with the surplus in all these years, for the private consumer had not received the benefit of it. In 1864, when the Gas Committee of the board was formed, and the company thought the matter would be inquired into, they deemed it prudent to take from the balance a large item for "distribution," in order to reduce the profits; but even when they had done that, they could not reduce the sum below £5700, when only £5125 was required to pay the dividends. In 1865 a new item for "depreciation" was subtracted, but after charging large sums both for "distribution and depreciation," they could not bring down the balance. The amount of the profits was £5264, when only £5125 was required to pay the dividends. In 1866 the amount charged for "distribution" was £2100, and "depreciation" £650, and yet the company could not reduce the balance to what it ought to be. He also mentioned that the company were building a magnificent residence for the engineer, &c., and carrying out other extensive works at the expense of the consumers——

Mr. FALLON: No, no.

Mr. WINTERBOTHAM: And said that, unless the latter banded together, and went to the Court of Quarter Sessions, they would not obtain those privileges which the Legislature intended them to receive, when a reduction was made in the dividends to be paid by the company. He mentioned that in the years he had indicated there had been a surplus of £12,483 on the profits of the company, which he supposed had gone into some of their pockets in the shape of interest.

Mr. JORDAN made some remarks with regard to the meters, which the board proposed should be fixed to every twelfth lamp, saying that the company would have nothing to assure them that the other lamps, having no meter, would not consume more gas than the one to which the meter was affixed. Again, with regard to subjecting themselves to £20 penalty, on the adjudication of two justices, the company wished to put an end to all unpleasantness between themselves and the board, and only desired what was fair and right.

Mr. WILLIAMS (gas inspector), in answer to a question put by Mr. Parsonage, said the difficulty as to the unmetered lamps consuming more gas than the metered ones could be obviated.

Mr. JORDAN: That is all we want.

Mr. DOWNING remarked that he should vote for the amendment, because the resolution pledged the commissioners to the alternative of erecting their own gas-works, and that was to be regretted, inasmuch as if the board failed to come to terms with the gas company, another mode of settling the question might be arrived at.

The CHAIRMAN then put Mr. Davis's amendment—to the effect that the last paragraph of the committee's proposals, confirmatory of the board erecting their own gas-works, be left over for consideration—which was lost, eight voting for, and nine against.

The original motion, for the confirmation of the resolution, was then put and carried—there being ten for and seven against it—and the meeting adjourned.

DR. HILLIER'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTH OF MAY, 1867:—

Maximum light estimated by sperm candles according to the Act	15·9
Minimum light—sperm candles	13·2
Average light—sperm candles	14·3
Traces of ammonia, indicated by turmeric test-paper	Usually.
Traces of sulphuretted hydrogen, indicated by lead test-paper	Never.

The illuminating power of the gas ranged from 13·2 to 15·0 sperm candles, the average being 14·3. Ammonia was present, as usual, and no sulphuretted hydrogen. In 100 cubic feet of gas there was found 13·4 grains of sulphur, the Act forbidding more than 20 grains.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN MAY, 1867:—

MAY.	Illuminating Power in Sperm Candles.			Mean Pressure in 10ths of an inch.	
	*Mean of 26 Observations.	Highest.	Lowest.	Highest.	Lowest.
Imperial Company's gas	14·38	14·98	14·02	23·28	7·73
Chartered Co.'s common gas	12·56	13·90	11·48	30·86	13·51
Chartered Co.'s cannel gas	21·49	24·47	20·13	28·93	9·66

* Each observation consists of 10 readings of the photometer.

The gas of the Imperial Company continues to maintain its usual high standard of illuminating power. During the month it has given a mean intensity of light equal to the light of 14 sperm candles, or 20 per cent. above the parliamentary standard. It was more than ordinarily uniform, for on no occasion did it vary to the extent of 1 candle. Its pressure was fair—not high. The mean light of the common gas of the Chartered Company was equal to 12½ sperm candles, or about 4½ per cent. above the standard; on four occasions it exceeded 13 candles, and three times it was found to be rather below the required 12 candles. Its pressure was always very good. The cannel gas of the same company showed an intensity of light equal to 21½ candles, or about 7 per cent. in excess of what the law requires; once it exceeded 24 candles, and on six other occasions it exceeded 22 candles. The pressure of this gas was also very satisfactory. All the gases have, during the month, maintained their usual state of purity—that is to say, they have always been free from sulphuretted hydrogen, but never quite free from ammonia. By referring to the table, it will be seen that the mean quantity of sulphur contained in the three gases has been considerably less than what is allowed by law. The above results are obtained from the gas manufactured by the Imperial Company, at their Fulham works, and from the Chartered Company's gas, manufactured at their works, Horseferry Road, Westminster.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN MAY, 1867:—

MAY.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	May, 1866. 0°	May, 1867. 0°	May, 1866. 0°	May, 1867. 0°	0°
Distilled Water					
West Middlesex water	18·80	18·04	0·68	0·68	—
Grand Junction water	18·76	18·56	0·73	0·64	—

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000) grains of water.

The water supplied to the parish by the two Thames companies continues to be, both as regards quantity and quality, very satisfactory. In the year 1851, the West Middlesex Company gave to their district a daily supply of 3,334,000 gallons; in the present year that has increased to 8,236,000 gallons. In the former year the daily quantity per head to the whole population of London was 19 gallons; now it amounts to 30 gallons, and, when it is remembered that of this quantity nearly two-thirds, or about 5 million gallons of the entire daily service runs to waste, we cannot in justice complain that our water supply is restricted. The process of purification which it undergoes at the hands of the companies, first in the subsiding reservoirs, and next in the filtering-beds, and which I briefly detailed in my last annual report, effectually removes all impurities held in suspension, and, to a great extent also, those held in solution; this fact has been determined by a careful analysis of the water before and after filtration; but although the water of the Thames is undoubtedly at the present time largely contaminated with sewage beyond the sources of our supply, we have the satisfactory assurance of an eminent authority (Dr. Frankland), whose researches on the subject have been considerable, that, "by gradual oxidation, partly in the pores of the soil, partly in the Thames or its tributaries, and partly in reservoirs, filters, and conduits, this sewage contamination is converted into comparatively innocuous inorganic compounds before it is delivered to the consumer." The legislative enactments at present in force, and those about to be adopted, for diverting and utilizing the sewage of such large towns as Oxford, Abingdon, Reading, Kingston, Richmond, Brentford, &c., &c., cannot fail still further to purify the waters of the Thames; if, therefore, all householders, and especially the landlords of small tenements, can be induced either by a becoming sense of their moral and social obligations, or by the more potent agency of the law, to attend to the condition of their water receptacles, in seeing them

properly situated, well covered, and periodically cleansed and repaired, no grounds whatever will exist for apprehending that in seasons of cholera or other epidemic, the free use of it as a potable water can in the slightest degree be objectionable.

COMPOSITION AND QUALITY OF THE METROPOLITAN WATERS, IN MAY, 1867.—The following are the returns of the Metropolitan Association of Medical Officers of Health:—

Names of Water Companies.	Tot. solid Matter per gal.	Loss by Ignition*	Oxidizable Organic Matter.†	Hardness.	
				Before Boiling.	After Boiling.
Thames Water Companies.	Grains.	Grains.	Grains.	Degrees.	Degrees.
Grand Junction	21·17	1·00	0·68	12·0	4·5
West Middlesex	19·00	0·45	0·40	11·5	3·5
Southwark and Vauxhall	18·43	0·50	0·46	12·0	4·0
Chelsea	20·83	0·75	0·69	12·0	4·0
Lambeth	20·77	0·50	0·64	12·0	4·0
Other Companies.					
Kent	26·62	0·20	0·18	15·0	8·0
New River	16·30	0·50	0·21	11·0	4·0
East London	18·74	0·51	0·39	11·0	4·0

HY. LETHEBY, M.B.

* The loss by ignition represents a variety of volatile matters, as well as organic matter, as ammoniacal salts, moisture, and the volatile constituents of nitrates and nitrites.

† The oxidizable organic matter is determined by a standard solution of permanganate of potash—the available oxygen of which is to the organic matter as 1 is to 8; and the results are controlled by the examination of the colour of the water when seen through a glass tube 2 feet in length and 2 inches in diameter.

IMPROVEMENTS IN STREET-LAMPS.—On the recommendation of Mr. W. Haywood, the engineer of the corporation of London, some greatly improved lamps, for lighting the streets of the City, are being tried by the Commissioners of Sewers. These lamps, which are cylindrical in form, are manufactured by Messrs. J. A. Forrest and Co., of Liverpool, and the advantages claimed for them are, that they are cheaper than other lamps of a similar kind, that they do not require glazing, the glass cylinders being slid into the lamp from the top, that they can be cleaned and lighted with great facility, and that the danger of breakage from change of temperature or concussion is lessened very considerably. Enamelled opal is employed in the construction of the cylinder, it being admirably adapted for withstanding heat, and reflecting the rays of light across the pavement, and the thick bars incidental to the common lamp are entirely done away with. Four lamps have been fixed by way of experiment; one at either end of King Street, Cheapside, and two in Prince's Street, one being opposite the Mansion House, and the other near Lothbury.

TANK AND GASHOLDER COMPETITION AT WEYMOUTH.—The following tenders were sent in for a brick tank, 81 feet 6 inches diameter and 24 feet deep, and a single-lift gasholder, 80 feet by 24 feet, for the Weymouth Consumers Gas Company, from plans prepared by Mr. Alfred Penny, London.

Tank.		*Gasholder.*	
Coker	£1335 10 0	Porter	£1880 0 0
Reynolds	1064 0 0	Hanna, Donald, & Co.	1500 0 0
Williams	967 10 0	Piggott and Son	1440 0 0
Seaman	765 10 0	Horton	1430 0 0
Dodson	759 0 0	Coulson & Co.	1413 0 0
		Tildesley	1128 0 0

THE LATE STEPHEN WHITE, INVENTOR OF HYDROCARBON GAS.—Subscriptions are earnestly solicited for the relief of the five orphan children of the late Stephen White, who died on the 22nd of March last, after five years suffering, during many months of which time he was completely prostrated. The children are left entirely destitute, and are ineligible for admission into the Orphan Asylum. Mr. White was a freemason, and any contributions from his brethren of the craft, or the general public, will be gratefully received by his brother-in-law, Mr. T. A. Hawkins, 9, Bennett Road, Holloway Road, London, N.

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum.	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited)	20 0 0	nil.	16 10 0
1000	20	Do., preference	20 0 0	10 0 0	27 10 0
750	20	Do., do., redeem.	10 0 0	10 0 0	12 10 0
40000	5	Bombay (Limited)	5 0 0	5 0 0	4½ to 5
10000	5	Do., third issue	3 0 0	5 0 0	3½ to 4
10000	20	British, Limited (Norwich, Hull-&-culcoates, Hanley, Tunstall & Shelton (Potteries), Trowbridge, & Holywell.)	20 0 0	6 0 0	28 to 29
12000	50	*Chartered*	50 0 0	8 10 0	54 to 55
6000	50	Do.	35 0 0	8 10 0	37 to 38
10000	20	*City of London,* A shares	20 0 0	8 0 0	24 to 25
10000	10	Do., B shares	10 0 0	4 0 0	6½ to 7
8000	10	Do., new shares.	10 0 0	8 0 0	11½ to 12½
25000	25	City of Moscow (L)	25 0 0	£7 intr.	16 to 17
17490	25	*Commercial*	25 0 0	10 0 0	31 to 32
2500	20	Continental Union	20 0 0	8 0 0	14 to 15
17500	20	Do.	15 0 0	8 0 0	9 to 10
10000	20	Do., preference	20 0 0	7 0 0	
5827	5	County & Gen. (L)	5 0 0	nil.	
2000	5	Do., preference (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0	nil.	
5000	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 14
5000	10	Do., preference	10 0 0	6 0 0	12½ to 13
0000	10	Do.	2 10 0	7 0 0	2½ to 3
4000	50	*Equitable*	50 0 0	10 0 0	66 to 67
4000	25	Do., new shares	25 0 0	10 0 0	33 to 34
23406	10	European (Lim.)	10 0 0	10 0 0	13 to 13¼
12000	10	Do., new shares	5 0 0	10 0 0	6½ to 6¾
		Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)			
20000	10	*Gt. Cent. Gas Cons.*	10 0 0	10 0 0	12½ to 13
5000	10	Hong Kong (Lim.)	10 0 0		8 to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	66 to 67
1300	100	Do., bonds	£100	10 0 0	170 to 172
2391	25	Imperial Austrian	25 0 0		
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	95¼ to 96¼
400	100	Impl. Mexican (L.)	75 0 0		
3000	40	*Independent*	40 0 0	10 0 0	53 to 56
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	62 to 63
5610	25	Do., 1st pref.	25 0 0	6 0 0	25 to 27
503	50	Do., 2nd pref.	50 0 0	6 0 0	
214	50	Do., 3rd pref.	50 0 0	6 0 0	
18781		Do., 1st pref. sk		6 0 0	
11828		Do., 2nd pref. sk		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	4 0 0	3½ to 4
6000	5	Do., preference	4 0 0	7 0 0	4 0 0
30000	5	Oriental, Calcutta	5 0 0	8 10 0	5⅝ to 5¾
30000	5	Do., new shares	1 0 0	8 10 0	1 to 1¼
10000	5	Ottoman (Limited)	5 0 0		1¼ to 2½
10000	10	Pará (Limited)	10 0 0	6 0 0	9½ to 9¾
27000	20	*Phœnix*	20 0 0	10 0 0	26 to 26½
3600	100	Do., new	25 0 0	7 10 0	24½ to 25½
144000	Sk.	Do.	100 0 0	5 0 0	70 to 71
5000	20	*Rateliff*	20 0 0	10 0 0	22 to 24
	20	Rio de Janeiro (L.)	20 0 0	10 0 0	21½ to 22½
6959	5	Singapore (Lim.)	5 0 0	3 10 0	
2000	5	Do., preference	5 0 0	7 10 0	
		Shanghai			
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	68 to 70
15000	10	*Surrey Consumers*	10 0 0	9 0 0	12½ to 13
10000	10	Do., new	5 0 0	9 0 0	7 to 7¼
9000	4	United General (Limerick)	4 0 0		
10000	10	*Victoria Docks*	5 0 0	6 0 0	
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13½ to 14
20000	10	Western (L.) Asb.	10 0 0	10 0 0	13½ to 14
10000	10	Do., B shares	5 0 0	10 0 0	6½ to 7
10000	10	Do., C shares	4 0 0	10 0 0	5½ to 6
20000	10	Do., D shares	1 0 0	10 0 0	1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares	3 0 0	7 10 0	3 18 0
551	10	West London Junction (Lim.)	10 0 0	6 0 0	
520	10	Do., preference	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 15 0	2 14 6	2 12 6	3 10 0	3 10 0
1¼ and 2-inch Socket-pipes	7 10 0	6 0 0	6 15 0	6 15 0	7 10 0
3¼ and 3-inch ditto	7 0 0	6 0 0	6 5 0	6 10 0	7 0 0
4 and 5-inch ditto	6 10 0	5 10 0	5 15 0	6 0 0	6 10 0
6 inches and upwards ditto	6 5 0	5 0 0	5 10 0	5 15 0	6 5 0
Retorts, 1st funion, hot blast	6 0 0	—	5 5 0	5 10 0	6 0 0
Ditto, 2nd ditto, cold ditto	7 0 0	5 15 0	5 15 0	6 0 0	7 0 0
Tank-plates, ¼ thick and above	6 10 0	5 10 0	5 10 0	5 15 0	6 5 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1¼ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 feet—per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ditto, from 6 inches to 18 inches—each	2 0	2 0	1 9	1 3	1 0	0 9
Connecting-pieces, or Long Screws	2 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows (wrought iron)	2 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	3 6	3 0	1 6	1 1	0 10
Crosses, ditto	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Haswells, Nettlesworth Primrose, and South Pelaw	7s. 6d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	8 0
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Peareth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead (at Leith)	55 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	32 6
Ditto (at Granton)	30 0
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	23 0
Pirnie, or Methill	15 0
Lothian's Cannel (at Leith)	29 0
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	6s. 0d
Cork	9s. to 9 6
Dover, Folkestne, & Ramsgate	6s. to 6 3
Dublin	9s. 6d. to 10 0
Exeter Quay	9 6
Ipswich	5 0
London (from Leith)	8 0
London (Pool)	6s to 6 3
Lowestoft and Yarmouth	4 6
Portsmouth & Southampton	7 0
Plymouth	8 0
Shoreham	6 9
Whitstable	5 9
Weymouth	7 6
Foreign.—Per Keel:—	
Barcelona	£19 10
Bordeaux	13 10
Boulogne and Calais	6 15
Cadiz	14 0
Cronstadt	9 0
Copenhagen	8 5
Genoa	16 0
Hamburg	7 10
Havre de Grace	8 15
Leghorn	16 0
Lisbon	£14 to 14 10
Rotterdam	£7 to 7 6
Stettin	8 10
Trieste	17 10
Venice	19 0

SUNDRIES.

Best Nstle. Fire-bks., p. 1000, £3. 10s. to £2	15 0
Cliff's Fire-bks. (at Wortley), p. 1000	2 15 0
Ingham's ditto (at Wortley), p. 1000	2 15 0
Fire-clay Retorts, p. ft. run, 5s. 6d. to	9 7 0
Tough Cake Copper, p. ton	82 0 0
English Pig Lead, p. ton	19 17 6
English Block Tin, p. ton	6 10 0
Welsh Bar Iron (in London), p. ton	21 0 0
Foreign Spelter, p. ton	89 0 0
English Block Tin, p. ton	92 0 0
Banca, p. ton	1 0 0
Tarred Rope Yarn, p. cwt.	

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

WILLIAM & BENJAMIN COWAN,

(ESTABLISHED 1827,)

WET AND DRY

GAS-METER MANUFACTURERS,

BUCCLEUCH STREET WORKS, EDINBURGH.

GAS EXPLOSIONS PREVENTED

BY THE USE OF

JOHN RUSSELL & CO.'S TUBES & FITTINGS.

Gas Explosions are of frequent occurrence, but we do not hear of them unless death has resulted. As in the case at Clerkenwell lately, gas explosions may generally be traced to the use of Tubes of defective workmanship and inferior iron. Adopt the Tubes and Fittings of John Russell and Co., which are all of the best quality.

JOHN RUSSELL & CO.

ARE THE

INVENTORS OF THE LAP-WELDED TUBE FOR LOCOMOTIVE & MARINE BOILERS,

AND THE OLDEST MANUFACTURERS OF TUBES FOR GAS, STEAM, & WATER.

WAREHOUSES:

69, Upper Thames Street, E.C.; Commercial Street, N.E.; & Charles Street, Soho Square, London; Also at 35, 36, 37, and 39, Granby Row, Manchester.

MANUFACTORIES:

The Old Tube Works, Wednesbury, and the Alma Works, Walsall, Staffordshire.

Address to 69, UPPER THAMES STREET, LONDON, E.C.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

WANTED, by the City of Durham Gas Company, a practical WORKING MANAGER for the manufacturing department, to reside on the works, and who understands fitting and laying of mains.

Apply by letter, stating salary required, addressed to J. E. MARSHALL, Esq., Chairman of the Company, DURHAM.

TO GAS APPARATUS MANUFACTURERS.

A GENTLEMAN of first-rate ability and repute, with a good appearance and address, calling on gas companies and fitters, wishes to fill up his time by representing another first-class house.

Address A. X., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES.

WANTED, by the Advertiser, a Situation as WORKING MANAGER of a Gas-Work, where the annual make is not less than 4 or 5 million cubic feet. He can set clay and iron retorts, lay mains, &c., and do gas-fitting in all its branches; take meters and all repairs connected with gas-works. Is manager of works now paying 10 per cent. First-class testimonials, &c.

Apply J. S, L., care of Mr. Thomas Sollory, Dale Street, BURTON-ON-TRENT.

GAS MANAGER WANTED.

WANTED, for a Gas-Work in a country town, a MANAGER who understands the manufacture and distribution of gas, also the erection of gas-fittings. He must have good testimonials. Wages 24s. per week, with house, fuel, and gaslight, besides some other small privileges.

Apply to JOHN R. WIGHAM, J. Edmundson & Co.'s, Capel Street, DUBLIN, or Great Winchester Street Buildings, LONDON.

WANTED, a good Stoker for a country Gas-Work. Constant employment.

Address A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO SMITHS, FITTERS, &c.

WANTED, a Man to repair and inspect meters, and to make himself generally useful about a Gas-Work.

Apply with references, and stating wages, to Mr. M'CAY, Manager, Gas-Works, Worthing, SUSSEX.

WANTED a Situation, foreign or otherwise, by the advertiser, who has served his apprenticeship and been for ten years with one of the largest gas companies in England. Thoroughly conversant with all official and monetary business, besides understanding the manufacture of gas, setting of retorts, distribution, laying of mains, &c. Fair draughtsman. Speaks French. Age 26; unmarried.

Address C. F. A., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in Berlin, a Manager of the technical department in the Municipal Gas-Works, being the most extensive in Germany. He would be entrusted with the superintendence of three Gas-Works, which, being constructed according to the newest systems, supplied last year 900 millions of cubic feet of gas. The establishment of a fourth work is intended. He would also be obliged to project the plans of increasing both the works and the pipes, and to take care of their being completed in the best way.

Any professional gentleman, who has already been the manager of a large Gas-Work would find in this situation the best sphere for his activity combined with a liberal salary.

Candidates for this place must send in their testimonials of their capacity before the 1st of August, 1867, and also a certificate which proves their having been before entrusted with the management of extensive Gas-Works, and address them to "The Municipal Gas-Works of Berlin, Kœnig Strasse, No. 7." Salary and further particulars will be agreed upon with the qualified candidate.

THE MAGISTRATES OF BERLIN.

Berlin, May 4, 1867.

SECOND-HAND Governor Wanted, in good condition. Complete. (4 in.) Cash paid on approval.

Apply SECRETARY, Gas-Works, Thrapston, NORTHAMPTONSHIRE.

FOR SALE, 1 set of 12-in. Reversible Gas Condensers, 12 ft. high; 8 square Chests; 31 double Pipes; 4 12-in. Face-Valves, and Connexions. Also, Self-Acting Overflow, with all Connexions. Also, 1 set 12-in. reversible Gas Condensers, 16 ft. high; 6 square Chests; 17 double Pipes; 4 12-in. Face-Valves, and Connexions. Also, Self-Acting Overflow, with all Connexions.

Apply to ALEXANDER GRAY, Gray's Place, St. Leonard's, EDINBURGH.

TAR & NAPHTHA.

TO BE LET, by Tender, for One, Three, or Five years, the TAR and NAPHTHA WORKS, situate in Farington, near Preston, together with the TAR produced at the works of the Preston Gas Company.

Further particulars may be had on application to the undersigned.

Tenders, addressed to the Directors of the Preston Gas Company, and endorsed "Tender for Tar-Works," &c., must be delivered not later than Saturday, the 13th day of July next.

HENRY GREEN, Engineer.

Preston, June 20, 1867.

TO GAS COMPANIES AND ENGINEERS.

FOR SALE.—A Good Cast-Iron Tank, in excellent condition, 45 feet diameter, 14 feet deep, either with or without Gasholder.

Also the following STATION-METERS:—

One to pass	12,000	cubic feet	per hour.
One	8,000	"	"
One	4,000	"	"
Two	3,000	"	"

The whole have been taken apart, thoroughly examined, and are in good working order, equal to new.

The above have been taken down to make room for larger.

Apply to JOHN VICKARY, Gas Engineering Works, EXETER.

TENDER FOR IRON-WORK & GAS APPARATUS.

THE Directors of the Preston Gas Company are prepared to receive TENDERS for the Retort Mouthpieces, Upright and other Pipes, Hydraulic Mains, Furnace Doors, &c., required for 210 Retorts. Also for Scrubbers, Condensers, and a set of four large Purifiers, &c.

Plans and specifications may be seen on and after Thursday, the 27th inst., at the Office of undersigned.

Tenders, addressed to the Directors of the Preston Gas Company, and endorsed "Tender for Gas Apparatus," must be delivered not later than Saturday, the 13th day of July next.

HENRY GREEN, Engineer.

Preston, June 20, 1867.

TAR & AMMONIACAL LIQUOR FOR SALE.

THE Directors of the Blackburn Gas-light Company are prepared to receive TENDERS for the purchase of all the TAR and AMMONIACAL LIQUOR to be produced at their works between the 1st of January, 1868, and the 30th of June, 1869.

Printed conditions and other information may be obtained from Mr. O. BROTHERS, the Company's Engineer, by whom tenders in writing will be received until the 1st of August next.

Gas-Works, Blackburn, June, 1867.

AMMONIACAL LIQUOR.

THE Board of Directors of the Com-mercial Gas Company will be prepared to receive TENDERS for the AMMONIACAL LIQUOR made at their works at Stepney for a term of One, Two, or Three years.

Tenders, to be endorsed "Tender for Ammoniacal Liquor," to be delivered at the Secretary's Office, on or before Thursday, the 27th inst.

Full particulars can be obtained upon application to the ENGINEER at the Works.

Stepney, June 14, 1867.

BALANCE-SHEETS AND REVENUE ACCOUNTS.

A FIRM of Accountants, much engaged in the preparation of Gas Companies Accounts, are open to contract for the keeping, balancing, or auditing the books of other Companies, which, from their experience, they are enabled to do on moderate terms.

Address, SANDELL & MADDERS, Accountants, 4, Skinner's Place, Size Lane, LONDON, E.C.

THE Directors of the Wandsworth and Putney Gaslight and Coke Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR, either together or separately, produced on their works from the 30th inst. to the 31st day of March, 1868.

Estimated quantity of Tar . . 62,000 gallons.
Do. do. Liquor. 90,000 "

Further particulars and conditions may be ascertained on application to the Company's Engineer, Mr. H. E. Jones, at the Gas-Works, Wandsworth.

Tenders to be sent under seal to the Offices of the Company, No. 14, High Street, Wandsworth, on or before the 29th inst., endorsed "Tender for Tar and Liquor."

By order of the Board,
ALFRED LASS, Secretary.

14, High Street, Wandsworth, June 15, 1867.

OPORTO GAS COMPANY.

THE Leases for the Supply of Gas having expired, owing to the death of the Lessee, J. A. Methven, Esq., the Company is desirous of CONTRACTING with any suitable person or public Company for the private and public SUPPLY of GAS in the City of Oporto for the term of seven years, beginning on the 1st of October next, and will receive tenders within sixty days from the present date.

The terms of the contract may be seen at No. 72, Rua do Breyner, Oporto, the private residence of the Director, from the 20th inst., where all necessary particulars may be also obtained.

The same Director is appointed to receive all tenders, duly sealed, and which shall be opened on the day next following the expiration of the sixty days above mentioned—viz., the 12th of August—in the presence of His Excellency the Chairman of the Board of a Committee already appointed for the purpose, as well as of any of the parties tendering, or their proxies.

FRANCISCO PINTO DE MIRANDA, Director.

Oporto, June 12, 1867.

WREXHAM WATER-WORKS COMPANY.

SECRETARY & MANAGER WANTED.

THE Directors of the Wrexham Water-Works Company require the Services of a competent person to act as MANAGER and SECRETARY. He will be required to devote his whole time to the service of the Company; to keep the accounts and collect same. He must have a knowledge of Water-Works details, including the repair of works, mains, and service-pipes, and to have been employed previously on Water-Works. Salary £125 per annum. Security will be required.

Apply, by letter only (enclosing testimonials), not later than the 22nd day of June instant, addressed "To the CHAIRMAN of the Water-Works Company," Wrexham, NORTH WALES.

Wrexham, June 4, 1867.

GAS OF HIGH ILLUMINATING POWER.

THE Trinidad Petroleum Company, Limited, will supply samples of their Trinidad PITCH for gas purposes of 1 lb. each free of charge, or samples of 1 ton or upwards at 45s. per ton, delivered on to the railway at Silvertown, on application being made to their SECRETARY, at the Offices of the Company, 110, CANNON STREET, E.C.

PIRNIE OR METHILL CANNEL.

ONE of the best Gas Producing Can-nels for bringing up the quality of ordinary coal gas. See Dr. Frankland's Lecture, reported in the JOURNAL OF GAS LIGHTING, 30th of April last.

For price apply to PIRNIE COAL COMPANY, Leven, FIFE.

NATURAL
HYDRATED OXIDE of IRON
constantly on Sale. Apply to
MARTYN DENNIS AND CO.,
LIVERPOOL.

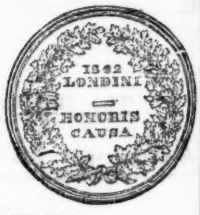
EDWARD COCKEY & SONS,

IRON-WORKS, FROME SELWOOD,

PATENT GAS-VALVES.

A PRIZE MEDAL

WAS AWARDED TO THE PATENTEES AT THE INTERNATIONAL EXHIBITION OF 1862.



These Valves are formed of two cylinders, working one on the other horizontally, having their faces ground perfectly gas-tight.

They are adapted either as central valves, for two, three, or four purifiers—as bye-passes—or as inlet and outlet-valves for gasholders.

They have been fixed in some of the most important Gas-Works in the Kingdom, for more than eight years. Considerably over two hundred of them are now in use, and the most satisfactory reports of their advantages continue to be received. They are simple in construction, and not liable to get out of repair, and if in course of time the faces should leak, they can be easily re-ground and made as tight as ever, without removal from their positions. Each Valve is fitted with an index, which shows to the person in charge of the Works in what direction the gas is passing.

Frome, January 20, 1866.